4029

PIONEER®
The Art of Entertainment

Service Manual

ORDER NO.
ARP2327

CATV CONVERTER

BA-6310
BA-6310C

● **This manual is applicable to the BA–6310/KU and BA–6310C/KU types.**

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PIONEER ELECTRONIC CORPORATION 4-1, Meguro 1-Chome, Meguro-ku, Tokyo 153, Japan
PIONEER ELECTRONICS SERVICE INC. P.O. Box 1760, Long Beach, California 90801 U.S.A.
PIONEER ELECTRONICS OF CANADA, INC. 505 Cochrane Drive, Markham, Ontario L3R 8E3 Canada
PIONEER ELECTRONIC [EUROPE] N.V. Haven 1087 Keetberglaan 1, 9120 Melsele, Belgium
PIONEER ELECTRONICS AUSTRALIA PTY. LTD. 178-184 Boundary Road, Braeside, Victoria 3195, Australia TEL: [03] 580-9911

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This service manual is intended for qualified service technicians; it is not meant for the casual do-it-yourselfer. Qualified technicians have the necessary test equipment and tools, and have been trained to properly and safely repair complex products such as those covered by this manual.
Improperly performed repairs can adversely affect the safety and reliability of the product and may void the warranty. If you are not qualified to perform the repair of this product properly and safely, you should not risk trying to do so and refer the repair to a qualified service technician.

WARNING
Lead in solder used in this product is listed by the California Health and Welfare agency as a known reproductive toxicant which may cause birth defects or other reproductive harm (California Health & Safety Code, Section 25249.5).
When servicing or handling circuit boards and other components which contain lead in solder, avoid unprotected skin contact with the solder. Also, when soldering do not inhale any smoke or fumes produced.

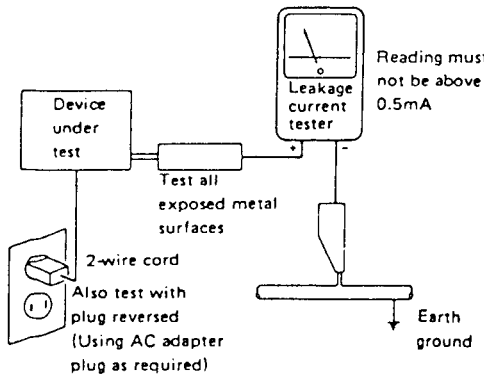
1. SAFETY INFORMATION

1. SAFETY PRECAUTIONS

The following check should be performed for the continued protection of the customer and service technician.

LEAKAGE CURRENT CHECK

Measure leakage current to a known earth ground (water pipe, conduit, etc.) by connecting a leakage current tester such as Simpson Model 229-2 or equivalent between the earth ground and all exposed metal parts of the appliance (input/output terminals, screwheads, metal overlays, control shaft, etc.). Plug the AC line cord of the appliance directly into a 120V AC 60Hz outlet and turn the AC power switch on. Any current measured must not exceed 0.5mA.


Reading must not be above 0.5mA
Leakage current tester
Device under test
Test all exposed metal surfaces
2-wire cord
Also test with plug reversed (Using AC adapter plug as required)
Earth ground

AC Leakage Test

ANY MEASUREMENTS NOT WITHIN THE LIMITS OUTLINED ABOVE ARE INDICATIVE OF A POTENTIAL SHOCK HAZARD AND MUST BE CORRECTED BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

2. PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in the converter have special safety related characteristics. These are often not evident from visual inspection; nor can the protection afforded by them necessarily be obtained by using replacement components rated for the same voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this Service Manual.

Electrical components having such features are identified by marking with a ⚠ on the schematics and on the parts list in this Service Manual.
The use of a substitute replacement component which does not have the same safety characteristics as the PIONEER recommended replacement one, shown in the parts list in this Service Manual, may create shock, fire, or other hazards.

Product Safety is continuously under review and new instructions are issued from time to time. For the latest information, always consult the current PIONEER Service Manual. Additional copies of PIONEER Service Manuals may be obtained at a nominal charge from PIONEER.

2. SPECIFICATIONS

2.1 RF

Frequency Range 52–554MHz
Channel Selection ..... 82 CH–STD
83 CH–HRC, IRC
Spectrum Allocation ..... STD/HRC/IRC Down–Line–Loadable
Channel Allocation ..... Down–Line–Loadable
Output Channel ..... CH.2/3 Down–Line–Loadable
Output Level ..... 6dBmV typ.
Input Return Loss ..... 6dB min.
(On tuned channel)
Output Return Loss ..... 6dB min.
Spurious Signals at Input ..... –30dBmV max.
(in 50–550MHz Range)
Spurious Signals at Output ..... –15dBmV max.
Local Oscillator Level at Input ..... –10dBmV max.
Feed–thru Isolation ..... –60dB max.
(at CH. 7)
Frequency Stability ..... ± 150kHz
(for long Term Drift)
Talk Back ..... –35dB max.

2.2 BASE BAND

Video S/N ..... 45dB typ.
(at +5dBmV input)
Audio S/N ..... 60dB typ.
(at Picture APL=0%, Audio 1kHz)
Differential Gain ..... 3% typ.
Differential Phase ..... 5 degrees typ.
Group Delay ..... 30nsec. typ.

2.3 DATA COMMUNICATION

Addressable Control Carrier 110MHz
Receiver Sensitivity ..... –19dBmV typ.
Upstream Carrier 20.5–26.0MHz
(0.5MHz intervals excluding 21.0MHz and 22.0MHz)

2.4 GENERAL

Safety Requirement ..... UL Approved
Power Requirement AC105–130V/60Hz
Power Consumption ..... 15W max.
Operating Temperature ..... 5 ℃ –40 ℃
Storage Temperature ..... –40 ℃ –60 ℃
Dimensions ..... 260 (W) × 205 (D) × 65 (H) mm
Net Weight ..... Approx. 1.8kg

Note: Specification and the design subject to possible modification without notice due to improvement.

ASSEMBLIES LIST

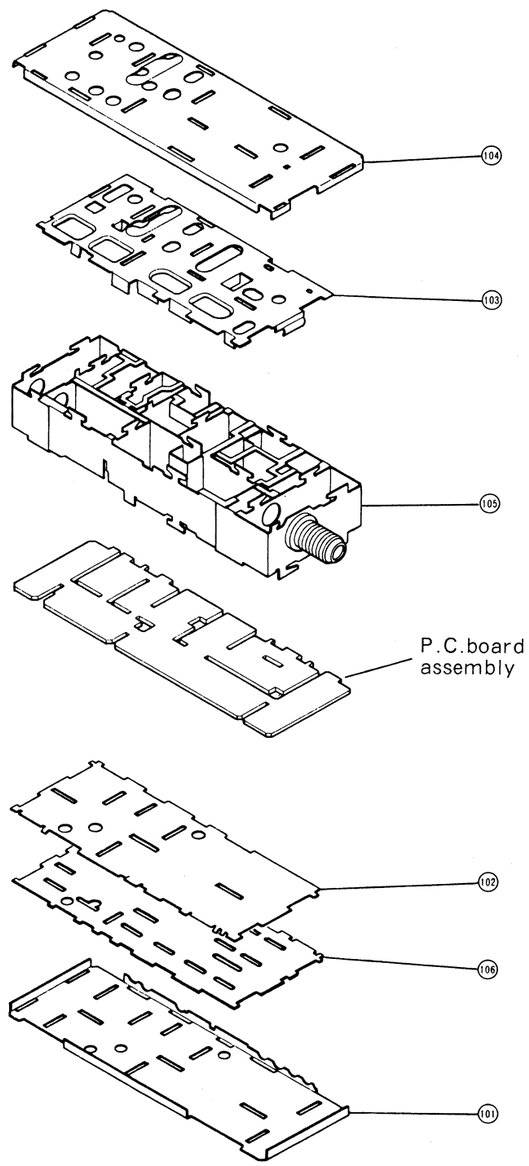
BA–6310, 6310C
- MAIN ASSEMBLY (BWM1100*)
  - Control assembly (BWZ1250) — Converter assembly (BWE1030)
  - AC power assembly (BWZ1192)
  - AC outlet assembly (BWZ1193)
  - Receiver assembly (BWZ1249)
- BA–6310C only
  - CABLE RETURN ASSEMBLY (BWX1034)

Note: * is non supply service parts.

3. EXPLODED VIEWS AND PARTS LIST

NOTES:
- The parts with an encircled number are generally unavailable because they are not in our Master Spare Parts List.
- The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- Parts marked by "⊙" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.

3.1 CONVERTER ASSEMBLY (BWE1030)



Parts List of BWE1030

Non–service–parts list

Mark	No.	Symbol & Description	Part No.
	101	Cover R	BZN1309
	102	Shield cover C	BZN1312
	103	Shield cover A	BZN1531
	104	Cover F	BZN1614
	105	Frame with F – type connector	BZN1530
	106	Shield cover B	BZN1373

3.2 INTERIOR

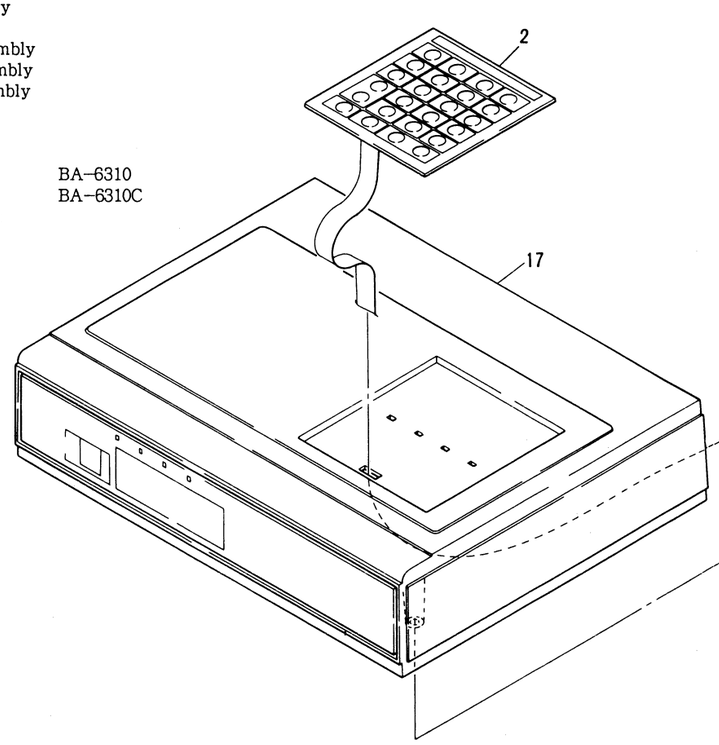
NOTES:

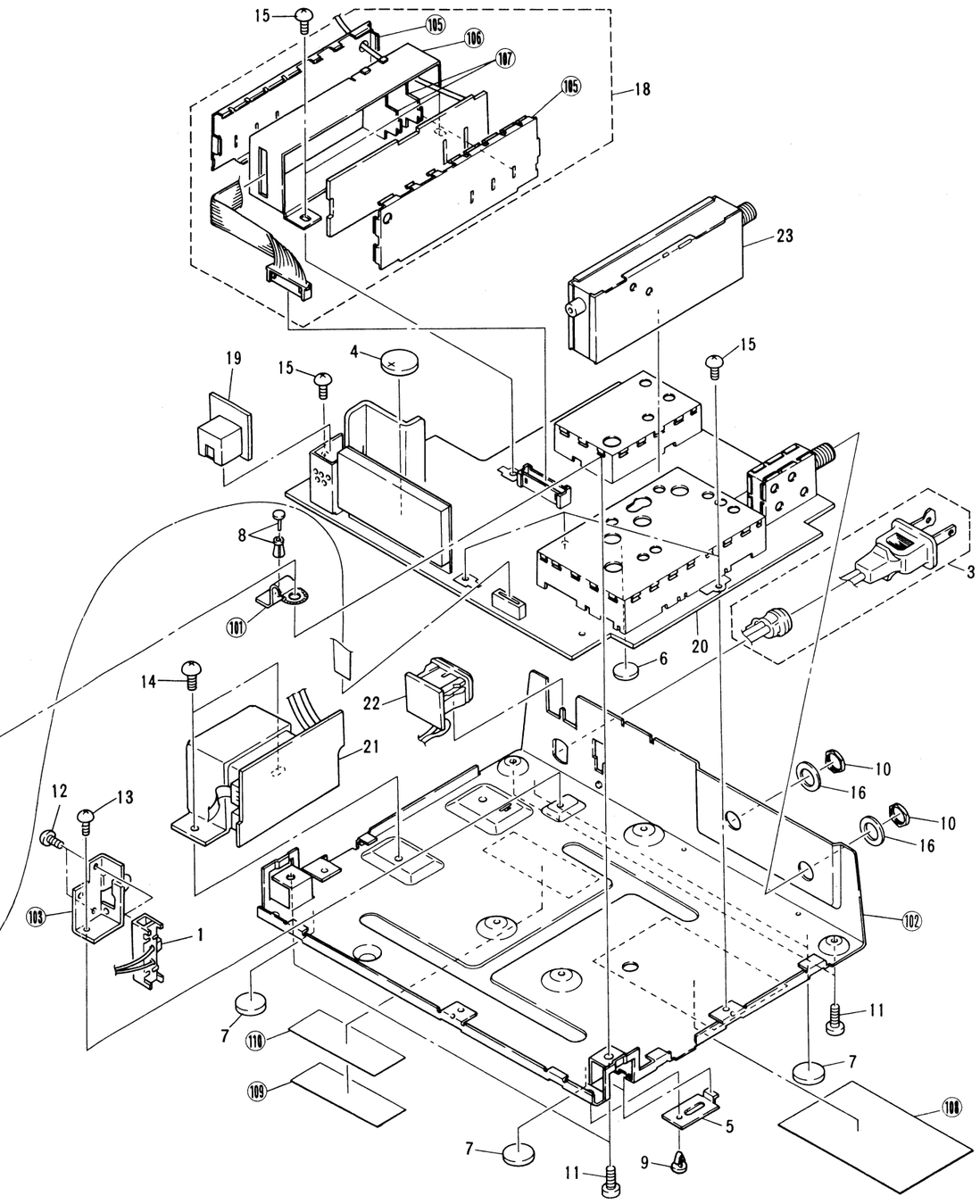
- The parts with an encircled number are generally unavailable because they are not in our Master Spare Parts List.
- The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- Parts marked by "⊙" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.

NON–SERVICE–PARTS LIST

No.	Part No.	Description	Remark
1	BSH – 007	Slide switch	
2	BSX1006	Membrane switch	
3	BDG1012	AC Power cord	⚠
4	AEX1014	Lithium battery	
5	BNF1003	Protective cover	
6	BEB1013	P.C.B. cushion	
7	BEB1015	Foot	
8	BEC1013	Rivet	
9	BEC1022	Anchor clip	
10	ABN – 059	Nut	
11	BBA1020	Tapping screw	
12	PMZ26P040FMC	Screw	
13	VBZ30P060FMC	Screw	
14	VBZ40P060FMC	Screw	
15	VCT30P060FMC	Screw	
16	WAX0F160N100	Washer	
17	BXB1034	Case mold assembly	
18	BWX1034	Cable return assembly	BA–6310C
19	BWZ1249	Receiver assembly	
20	BWZ1250	Control assembly	
21	BWZ1192	AC power assembly	
22	BWZ1193	AC outlet assembly	
23	BWE1030	Converter assembly	
24	·····		
	BRB1029	Manual	
	BHD1143	Packing case	BA–6310
	BHD1144	Packing case	BA–6310C
	BAX1001	Protective sheet	
	BHA1027	Snow box	
	BZG1007	Screwdriver for tapping screw	

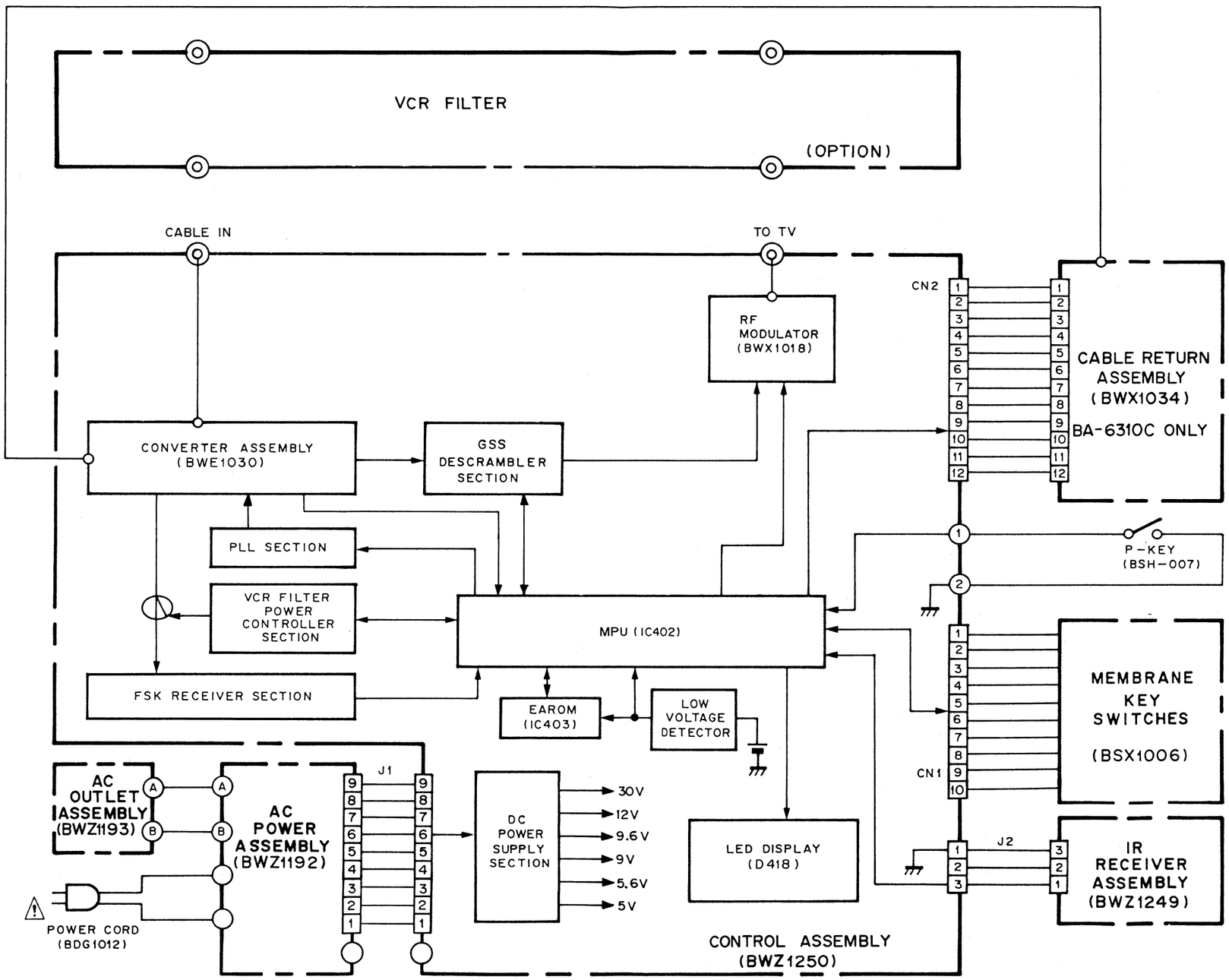
No.	Part No.	Description	Remark
101	BNG1054	Trap plate	
102	BNA1036	Chassis	
103	BNG1029	P – key base	
104	·····		
105	BNK1019	Cover	
106	BNK1018	Case	
107	BNK1020	Partition plate	
108	BAL1126	Name plate	BA–6310
	BAL1127	Name plate	BA–6310C
109	BAX1003	Protective sheet	
110	BAX1017	Bar code label	
	AEC – 093	Binder	
	BHG – 014	Nylon bag	
	BAX – 027	Bar code label	



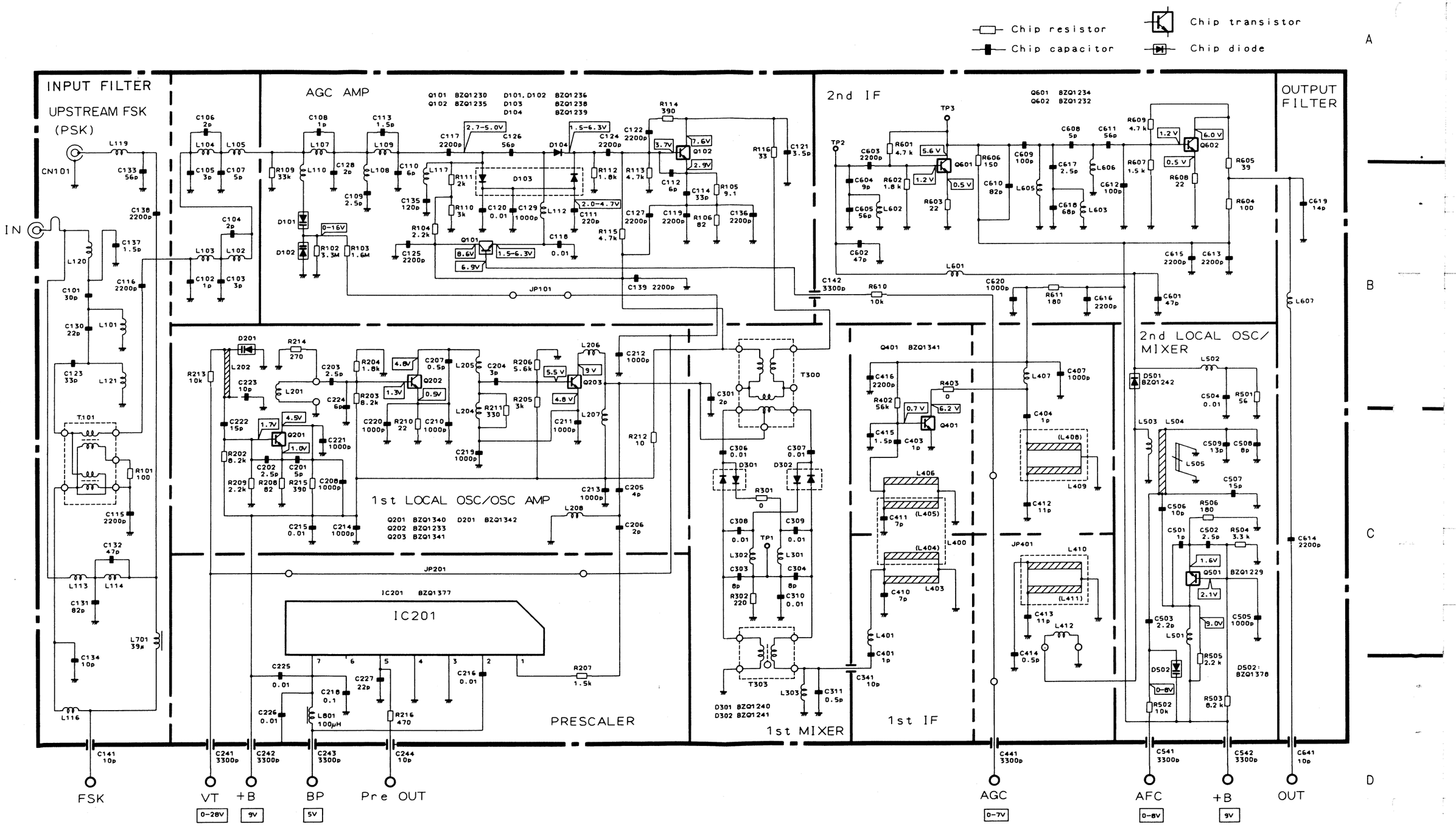


4. SCHEMATIC DIAGRAMS AND P.C.B PATTERN

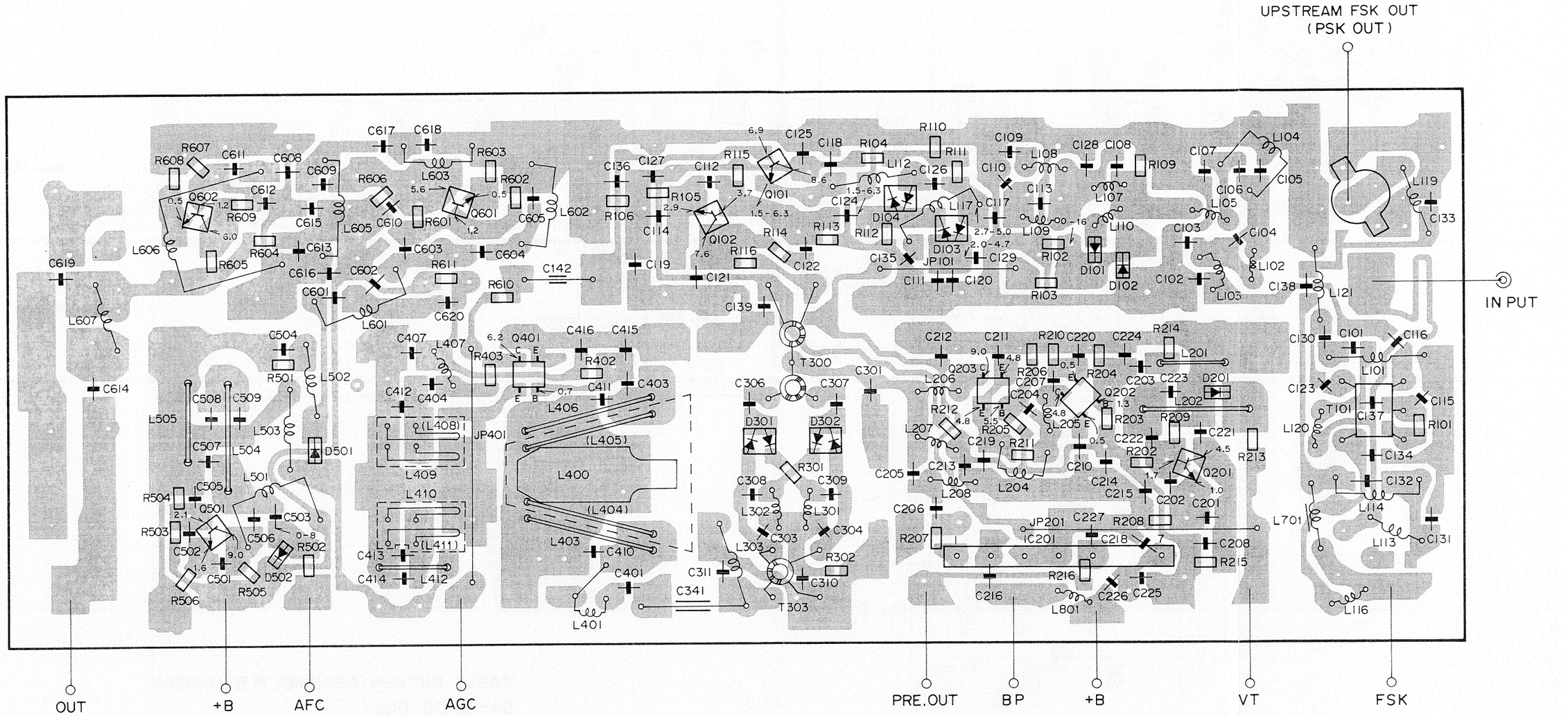
4.1 BLOCK DIAGRAM



4.2 CONVERTER ASSEMBLY (BWE1030)

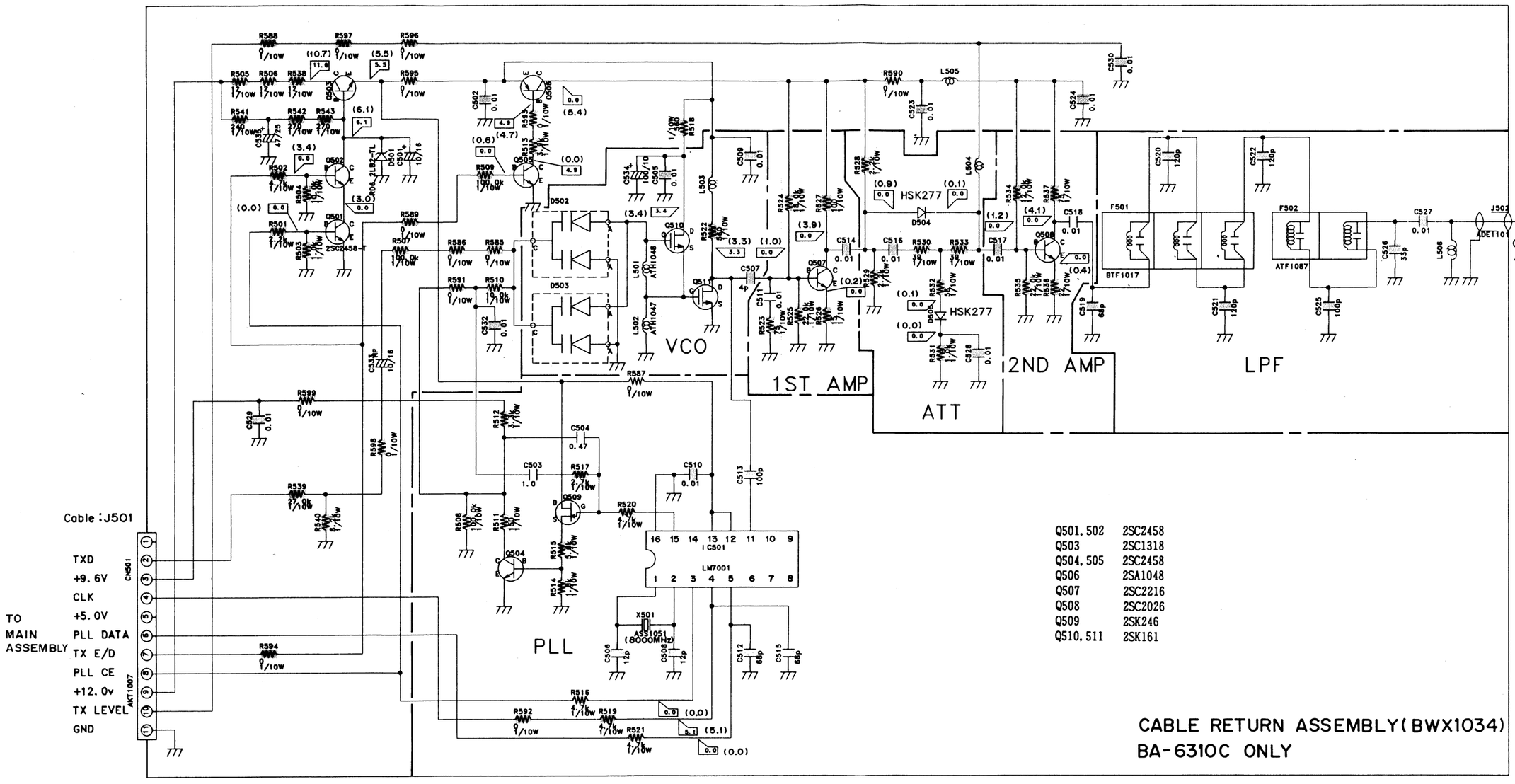


• View from component side



4.3 MAIN AND CABLE RETURN ASSEMBLY

: is a chip part.



Q501, 502	2SC2458
Q503	2SC1318
Q504, 505	2SC2458
Q506	2SA1048
Q507	2SC2216
Q508	2SC2026
Q509	2SK246
Q510, 511	2SK161

CABLE RETURN ASSEMBLY(BWX1034)
BA-6310C ONLY

1. RESISTORS :
   Indicated in Ω, 1/4W, 1/8W, ±5% tolerance unless otherwise noted k ; kΩ, M ; MΩ, (F) ; ±1%, (G) ; ±2%, (K) ; ±10%, (M) ; ±20% tolerance.

2. CAPACITORS :
   Indicated in capacity (μF) /voltage (V) unless otherwise noted p ; pF. Indication without voltage is 50V except electrolytic capacitor.

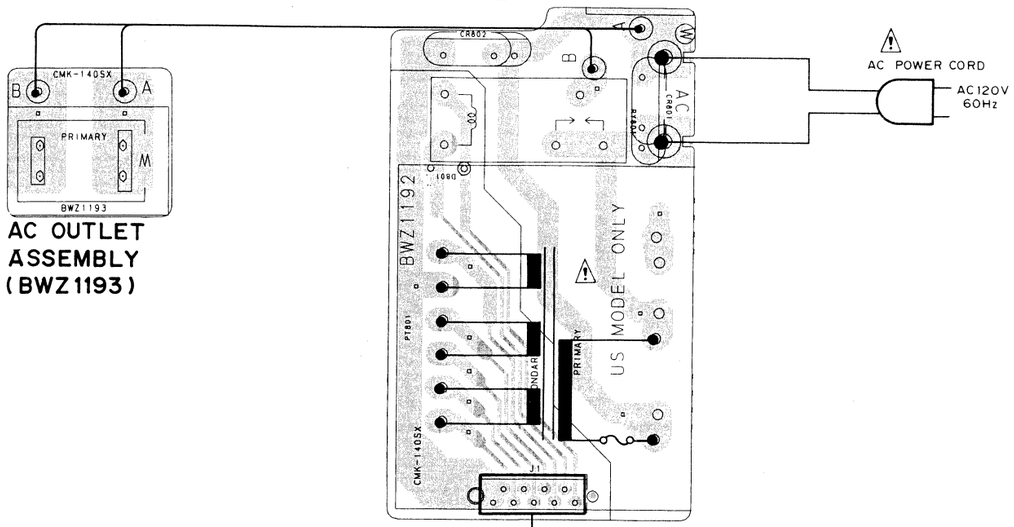
3. VOLTAGE CURRENT :
   [ ] V ; DC voltage at TX. Disable.
   ( ) V ; DC voltage at TX. Enable.

4. OTHERS :
   ➡ ; Signal route.
   ⊘ ; Adjusting point.
   The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
   ※ marked capacitors and resistors have parts numbers.

   This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.

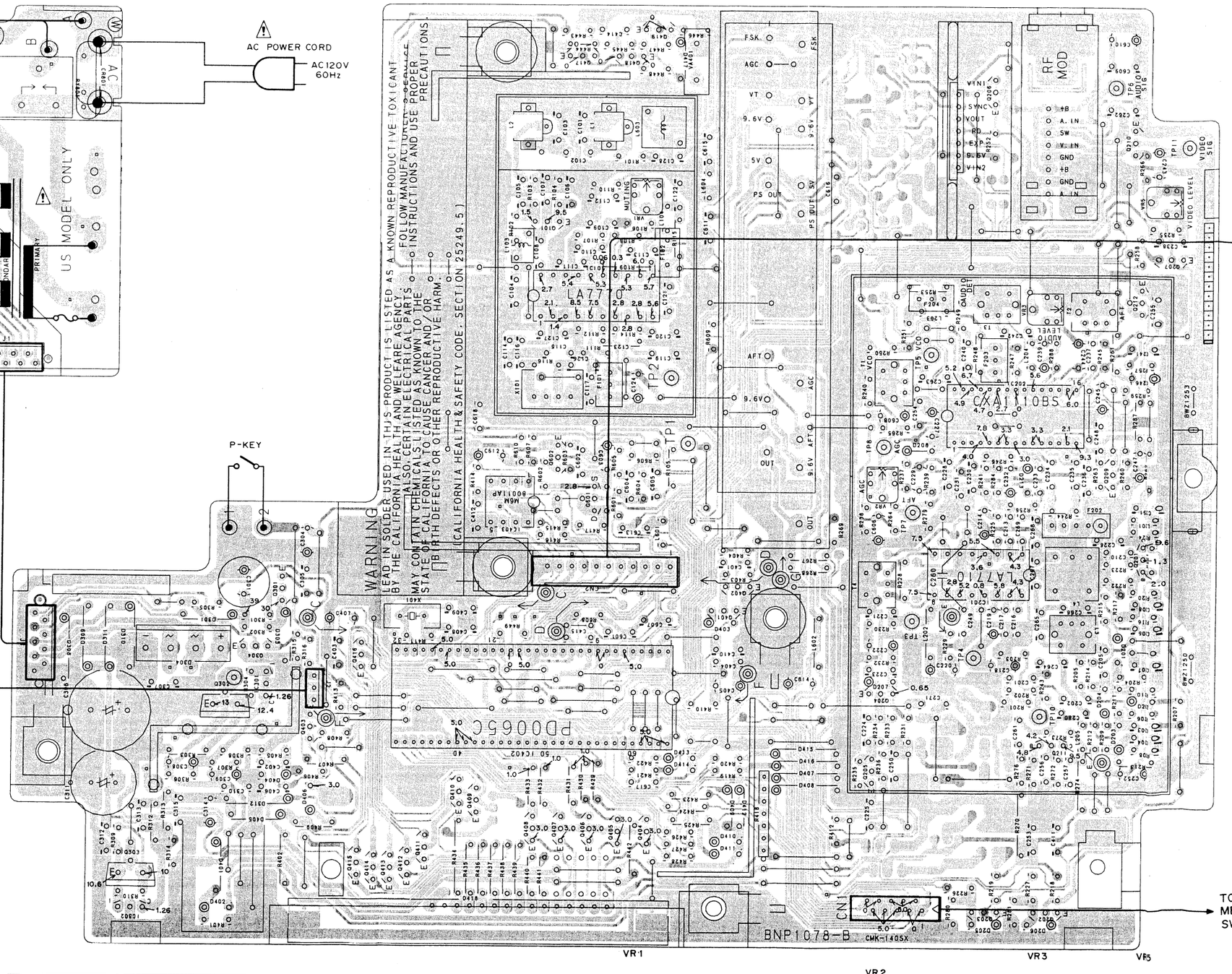
• View from component side

AC POWER ASSEMBLY
(BWZ1192)

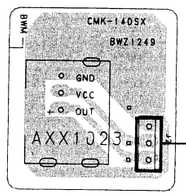


AC OUTLET
ASSEMBLY
(BWZ1193)

CCNTROL ASSEMBLY (BWZ1250)

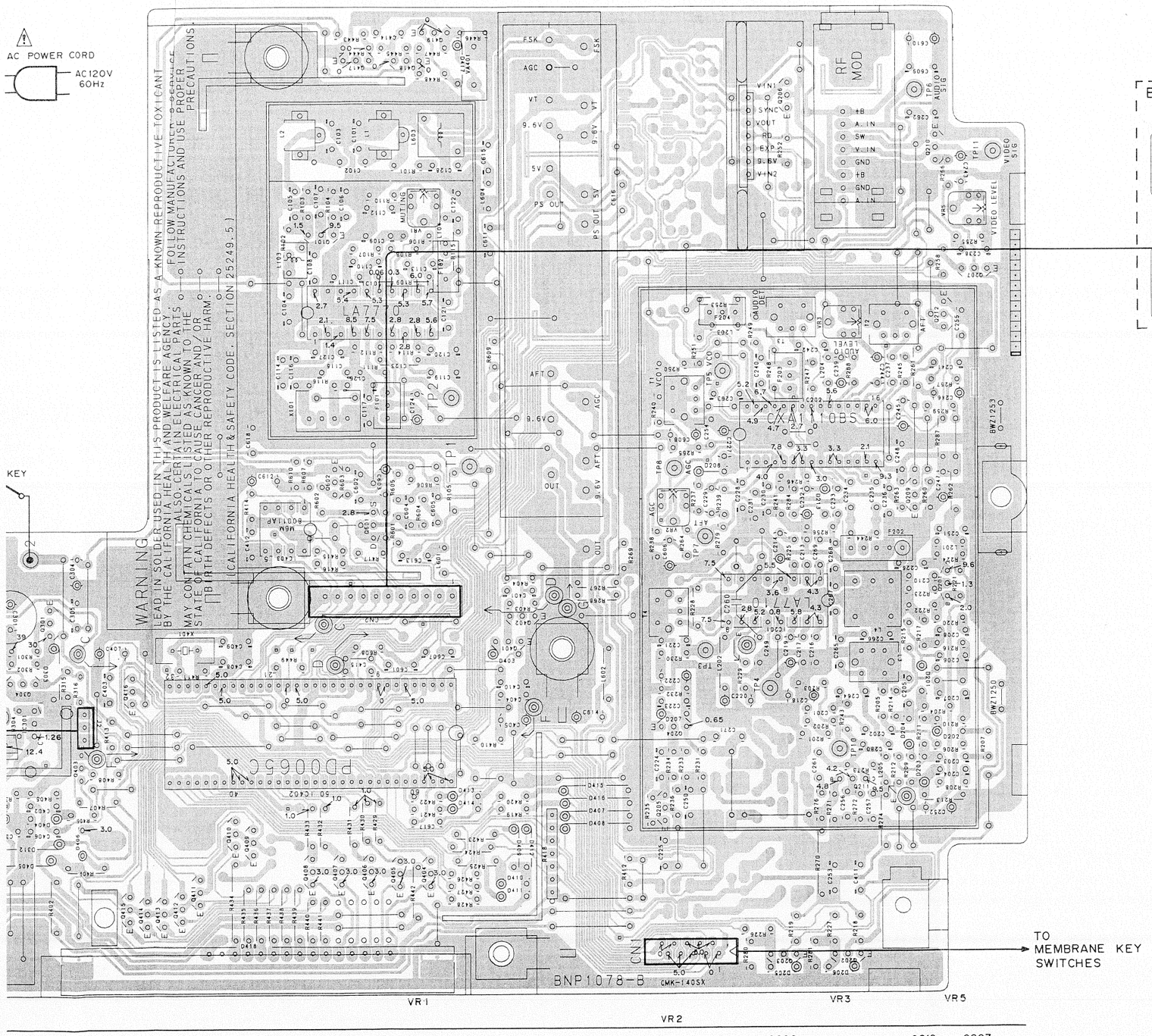


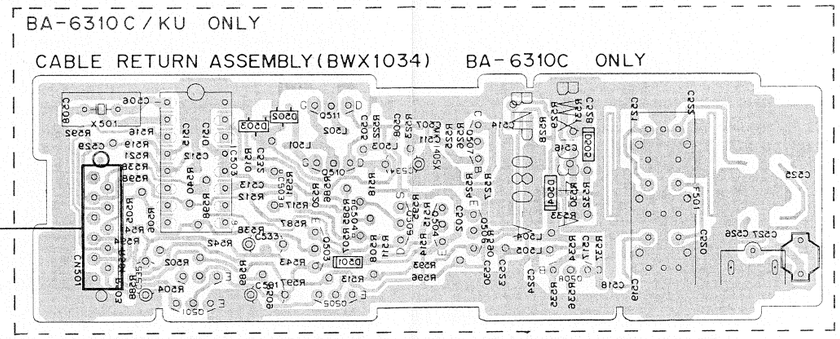
RECEIVER
ASSEMBLY
(BWZ1249)



Q303 IC302 Q304 Q301 Q416 Q302 IC301 Q403 Q415 Q414 Q413 Q412 Q411 Q101 Q417 Q418 Q419 IC403 Q602 IC101 Q601 Q410 Q409 IC402 Q408 Q407 Q406 Q405 Q404 Q401 Q402 Q205 Q204 Q206 IC201 IC202 Q203 Q211 Q202 Q210 Q207 Q209 Q212 Q201

CONTROL ASSEMBLY (BWZ1250)





NOTE

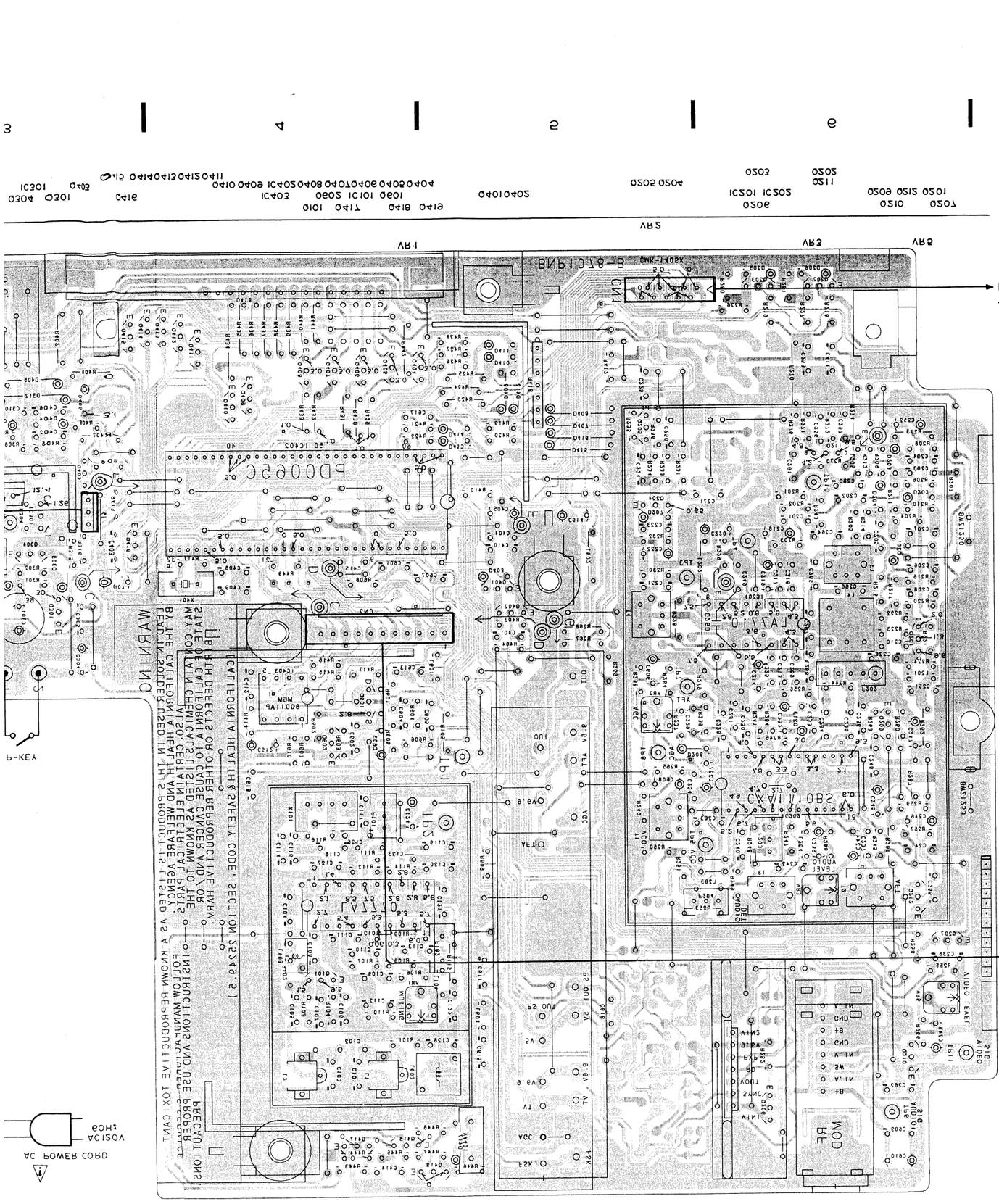
1. This P.C.B connection diagram is viewed from the parts mounted side.
2. The parts which have been mounted on the board can be replaced with those shown with the corresponding wiring symbols listed in the following Table.

P.C.B. pattern diagram indication	Corresponding part symbol	Part Name
Q504 (E)	E or E	Transistor
Q215	or	Radiator type transistor
D203	D203	Diode
R237	R237	Resistor
C513	+	Capacitor (Polarized)
C518		Capacitor (Non-polarized)

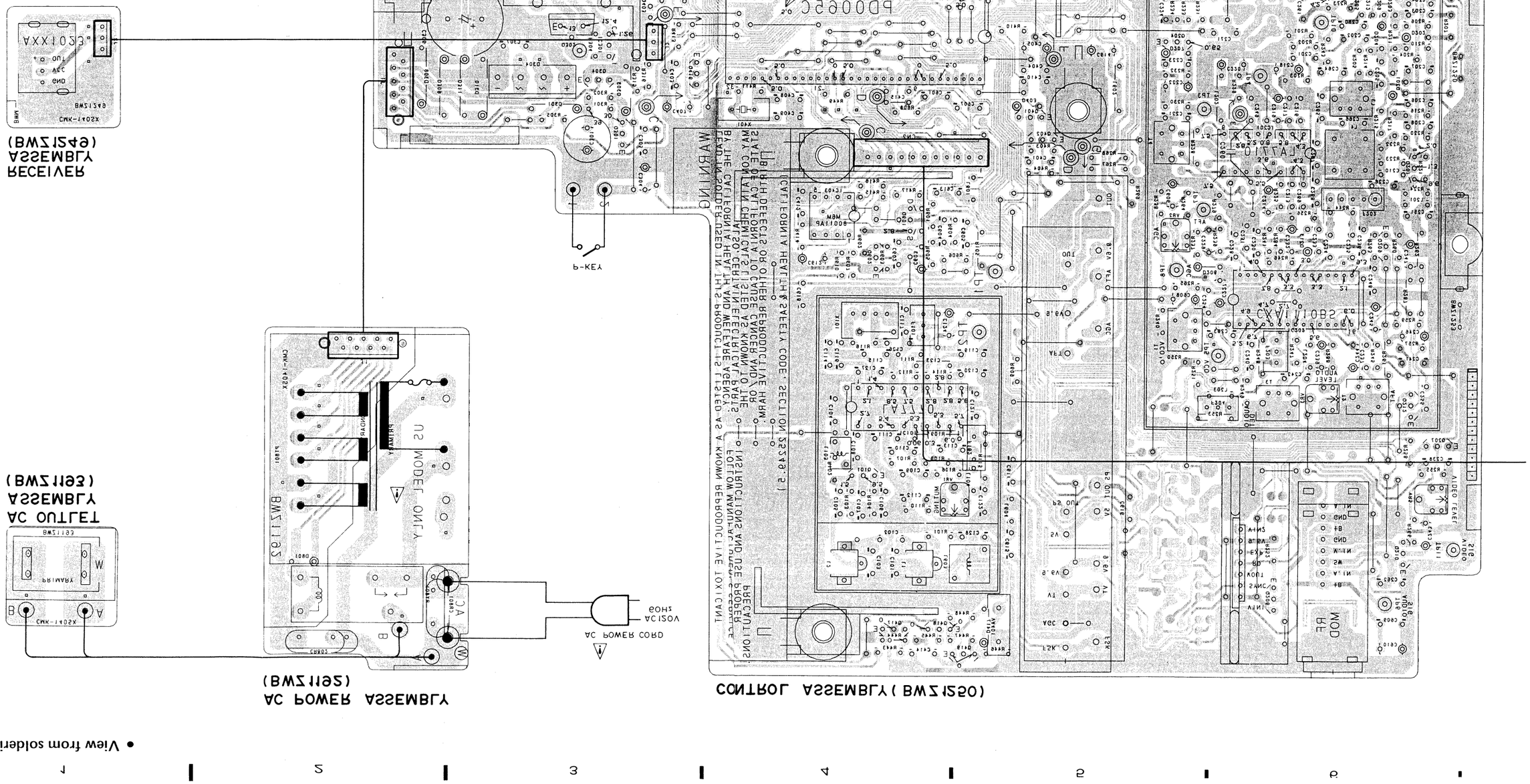
Others

P.C.B. pattern diagram indication	Part Name
IC	IC
S	Switch
RY	Relay
L	Coil
F	Filter
VR	Variable resistor or Semi-fixed resistor

3. The capacitor terminal marked with (double circles) shows negative terminal
4. The diode terminal marked with (double circles) shows cathode side.
5. The transistor terminal to which E is affixed shows the emitter.



BA-6310, BA-6310C


CONTROL ASSEMBLY (BWZ1520)
AC POWER ASSEMBLY
(BWZ1115E)
AC OUTLET
ASSEMBLY
(BWZ1515B)
RECEIVER
ASSEMBLY
(BWZ1548)
TO SPEAKER SYSTEM
AC POWER CORD
P-KEY
CAUTION
BEFORE LEAVING THE CUSTOMER, BE SURE TO RETURN THE PROTECTIVE DEVICES THAT WERE REMOVED.
WARNING
DISCONNECT THE ANTENNA, EARTH GROUND AND ALL POWER CORDS BEFORE REMOVING BACK COVER.
DANGER
INVISIBLE LASER RADIATION WHEN OPEN AVOID EXPOSURE TO BEAM
CAUTION
THIS PRODUCT UTILIZES A LASER. USE OF CONTROLS OR ADJUSTMENTS OR PERFORMANCE OF PROCEDURES OTHER THAN THOSE SPECIFIED HEREIN MAY RESULT IN HAZARDOUS RADIATION EXPOSURE.
CAUTION
TO PREVENT FIRE OR SHOCK HAZARD, REPLACE ONLY WITH SAME TYPE FUSE.
CAUTION
TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.
WARNING
TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.
WARNING
THIS EQUIPMENT HAS BEEN DESIGNED AND MANUFACTURED TO ASSURE PERSONAL SAFETY. IMPROPER USE CAN RESULT IN POTENTIAL ELECTRICAL SHOCK OR FIRE HAZARD. IN ORDER TO AVOID SUCH HAZARDS, PLEASE OBSERVE THE FOLLOWING INSTRUCTIONS.
CAUTION
RISK OF ELECTRIC SHOCK DO NOT OPEN
CAUTION
THIS PRODUCT CONTAINS CHEMICALS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER AND BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM. WASH HANDS AFTER HANDLING.
WARNING
THIS PRODUCT CONTAINS CHEMICALS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER AND BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM. WASH HANDS AFTER HANDLING.
CAUTION
FOR CONTINUED PROTECTION AGAINST FIRE HAZARD, REPLACE ONLY WITH SAME TYPE FUSE AS MARKED ON THE PRODUCT

CONTROL ASSEMBLY

IC101	LA7770
IC201	LA7710
IC202	CXA1110BS
IC301, 302	M5237L
IC402	PD0065C
IC403	MGM80011AP
Q101	2SC2786
Q201	2SC2216
Q202-205	2SC2458
Q206	2SA1048
Q207	2SC2458
Q209, 210	2SC2458
Q211	2SC2216
Q212	XDC124ES
Q301	2SC2458
Q302, 303	2SB1375
Q304	2SC1318
Q401-403	2SC2458
Q404-408	2SC1318
Q409-416	DTA123JS
Q417	2SC2458
Q418	2SC1318
Q419	2SC2458
Q601	2SK246
Q602	2SC2458
D418	BEL1008

CONTROL

CONTROL ASSEMBLY BWZ1250

CONVERTER ASSEMBLY

CABLE IN

UP STREAM IN

FSK VT +B1 +B2 P-3 OUT AGC AFC +B1 IF OUT

DSCR SECTION

9.6V

5V

9.6V(L)

LOGIC SECTION

FA ADJ

FSK SECTION

FSK MUTE ADJ

FSK LEVEL

30V

POWER SUPPLY SECTION

AC POWER ASSEMBLY BWZ1192

AC POWER CORD BDG1012

AC 120V 60Hz

AC OUTLET ASSEMBLY BWZ1193

12V(UN)

9V(UN)

5.6V

RXD

CONTROL ASSEMBLY BWZ1250

DSCR SECTION

LOGIC SECTION

SUPPLY SECTION

FSK MUTE ADJ

RF ACC ADJ

FA ADJ

FA ADJ

9.6V

5V

30V

5.6V

12V(UN)

9V(UN)

9.6V(L)

9V

IC101

IC201

IC301

IC302

IC402

IC403

X101

X401

F101

F102

TP10

TP20

TP6

TO
CABLE RETURN
ASSEMBLY
CN501
(BA-6310C/KU ONLY)

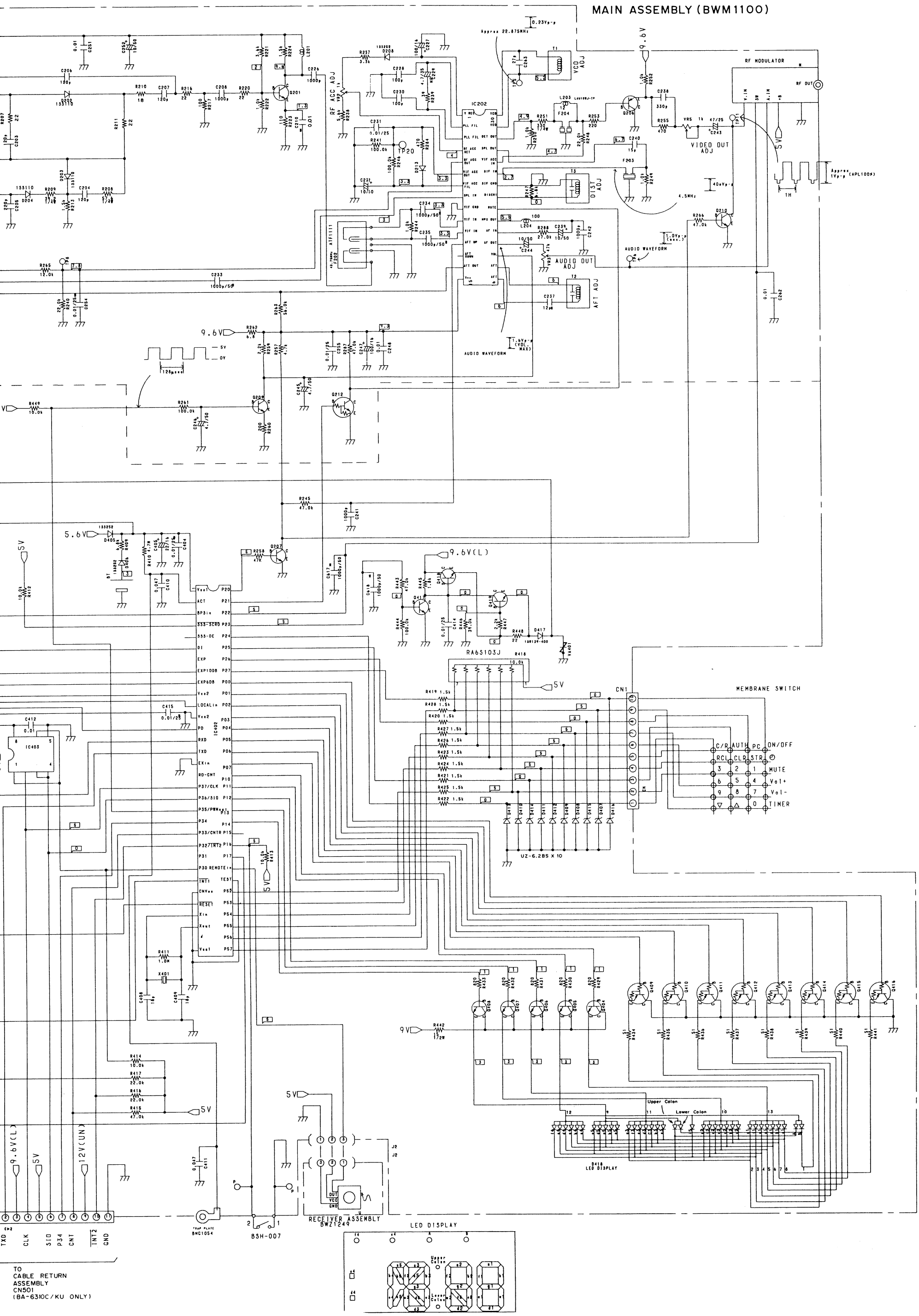
RECEIVER ASSEMBLY
BWZ1249

LED DISPLAY

8SH-007

TRAP PLATE
BNC1054

MAIN ASSEMBLY (BWM1100)



5. P.C.B's PARTS LIST

NOTES:

- Parts without part number cannot be supplied.
- Parts marked by "⊙" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.
- The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- When ordering resistors, first convert resistance values into code form as shown in the following examples.

Ex.1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J=5%, and K=10%)

560 Ω → 56×10^1 → 561 ····· RD1/4PS 5 6 1 J
47k Ω → 47×10^3 → 473 ····· RD1/4PS 4 7 3 J
0.5 Ω → 0R5 ····· RN2H 0 R 5 K
1 Ω → 010 ····· RS1P 0 1 0 K

Ex.2 When there are 3 effective digits (such as in high precision metal film resistors).

5.62k Ω → 562×10^1 → 5621 ····· RN1/4SR 5 6 2 1 F

5.1 CONVERTER ASSEMBLY (BWE1030)

[SEMICONDUCTORS]

Part No.	Description	Remark
BZQ1377	IC201	
BZQ1229	Q501	
BZQ1230	Q101	
BZQ1232	Q602	
BZQ1233	Q202	
BZQ1234	Q601	
BZQ1235	Q102	
BZQ1340	Q201	
BZQ1341	Q203, Q401	
BZQ1236	D101, D102	
BZQ1238	D103	
BZQ1239	D104	
BZQ1240	D301	
BZQ1241	D302	
BZQ1242	D501	
BZQ1342	D201	
BZQ1378	D502	

[COILS]

Part No.	Description	Remark
BZT1314	T300 BALUN TRANSFORMER	
BZT1374	L505 ANTENNA COIL	
BZT1425	L201, L412 ANTENNA COIL	
BZT1426	T101 BALUN TRANSFORMER	
BZT1427	T303 BALUN TRANSFORMER	
LAU101K	L801 AXIAL INDUCTOR	
LAU390K	L701 AXIAL INDUCTOR	

[CAPACITORS]

Part No.	Description	Remark
BZC1394	C133	
BZC1447	C142, C241-C243, C441, C541, C542	
BZC1450	C115, C122, C125, C127, C139, C416, C603, C613, C615, C616	
BZC1451	C102, C108, C401, C403, C501	
BZC1452	C415	
BZC1453	C104, C106, C128, C206, C301	
BZC1454	C205	
BZC1455	C208, C211-C214, C220, C620	
BZC1456	C103, C105, C204	
BZC1457	C107	
BZC1458	C120, C215, C225, C226, C306-C310, C504	
BZC1459	C130, C227	
BZC1462	C110, C112, C224	
BZC1464	C109, C202, C203, C502, C617	
BZC1465	C131, C610	
BZC1466	C123	
BZC1467	C303, C304	
BZC1475	C618	
BZC1617	C216	
BZC1634	C111	
BZC1636	C604	
BZC1637	C609, C612	
BZC1733	C141, C244, C341, C641	
BZC1734	C126, C605, C611	
BZC1735	C113, C137	
BZC1736	C121	
BZC1737	C201, C608	
BZC1738	C207, C311, C414	
BZC1740	C404	
BZC1745	C619	

Part No.	Description	Remark
BZC1920	C101	
BZC1921	C114	
BZC1922	C129, C221, C505	
BZC1923	C132	
BZC1924	C134	
BZC1925	C135	
BZC1926	C218	
BZC1927	C223	
BZC1928	C410	
BZC1929	C411	
BZC1930	C503	
BZC1931	C506	
BZC1932	C508	
BZC1933	C509	
BZC1938	C222, C507	
BZC1939	C412, C413	
ICX-089	C116, C117, C119, C124, C136, C138, C614	
ICX-091	C118	
ICX-093	C601, C602	
ICX-098	C210, C219, C407	

[RESISTORS]

Part No.	Description	Remark
BZC1008	R212	
BZC1381	R605	
BZC1384	R213, R502	
BZC1478	R211	
BZC1479	R109	
BZC1480	R101	
BZC1481	R207, R607	
BZC1484	R110, R205	
BZC1486	R610	
BZC1487	R209, R505	
BZC1488	R113, R115, R601, R609	
BZC1489	R302	
BZC1491	R111	
BZC1492	R301	
BZC1493	R206	
BZC1494	R202, R203, R503	
BZC1495	R501	
BZC1496	R504	
BZC1649	R116	
BZC1747	R102	
BZC1748	R103	
BZC1750	R112, R204, R602	
BZC1752	R114	
BZC1753	R604	
BZC1754	R214	

Part No.	Description	Remark
BZC1756	R402	
BZC1757	R210, R603, R608	
BZC1758	R606	
BZC1934	R105	
BZC1935	R106	
BZC1936	R215	
BZC1937	R506, R611	
BZC1952	R216	
ICN-025	R104	
ICN-046	R403	
ICN-057	R208	

[OTHER]

Part No.	Description	Remark
BZK1274	CN101 MINI JACK	

NON-SERVICE-PARTS

[COILS]

Part No.	Description	Remark
BZT1001	L603, L607 AIR-CORE COIL	
BZT1002	L102, L401 AIR-CORE COIL	
BZT1003	L103, L105, L204 AIR-CORE COIL	
BZT1005	L501 AIR-CORE COIL	
BZT1245	L110 AIR-CORE COIL	
BZT1294	L202 RESONANCE BAR	
BZT1295	L504 RESONANCE BAR	
BZT1297	L406 RESONANCE BAR	
BZT1298	L400 RESONANCE BAR	
BZT1300	L104, L108, L205 AIR-CORE COIL	
BZT1301	L207 AIR-CORE COIL	
BZT1302	L301 AIR-CORE COIL	
BZT1303	L302 AIR-CORE COIL	
BZT1305	L601 AIR-CORE COIL	
BZT1312	L117 AIR-CORE COIL	
BZT1376	L112, L605 AIR-CORE COIL	
BZT1377	L208 AIR-CORE COIL	
BZT1380	L503 AIR-CORE COIL	
BZT1421	L403 RESONANCE BAR	
BZT1422	L408, L409 RESONATOR BAR	
BZT1423	L107, L109, L120, L206 AIR-CORE COIL	
BZT1424	L303 AIR-CORE COIL	
BZT1429	L407 AIR-CORE COIL	
BZT1430	L502 AIR-CORE COIL	
BZT1431	L602 AIR-CORE COIL	
BZT1495	L101 AIR-CORE COIL	
BZT1496	L113 AIR-CORE COIL	
BZT1497	L114 AIR-CORE COIL	
BZT1498	L116 AIR-CORE COIL	
BZT1499	L119 AIR-CORE COIL	
BZT1500		
BZT1501		

[OTHERS]

Part No.
BZA1169
BZA1190
BZK1301
BZN1309
BZN1312
BZN1373
BZN1530
BZN1531
BZN1614

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Remark

Part No.	Description	Remark
BZC1920	C101	
BZC1921	C114	
BZC1922	C129, C221, C505	
BZC1923	C132	
BZC1924	C134	
BZC1925	C135	
BZC1926	C218	
BZC1927	C223	
BZC1928	C410	
BZC1929	C411	
BZC1930	C503	
BZC1931	C506	
BZC1932	C508	
BZC1933	C509	
BZC1938	C222, C507	
BZC1939	C412, C413	
ICX-089	C116, C117, C119, C124, C136, C138, C614	
ICX-091	C118	
ICX-093	C601, C602	
ICX-098	C210, C219, C407	

[RESISTORS]

Part No.	Description	Remark
BZC1008	R212	
BZC1381	R605	
BZC1384	R213, R502	
BZC1478	R211	
BZC1479	R109	
BZC1480	R101	
BZC1481	R207, R607	
BZC1484	R110, R205	
BZC1486	R610	
BZC1487	R209, R505	
BZC1488	R113, R115, R601, R609	
BZC1489	R302	
BZC1491	R111	
BZC1492	R301	
BZC1493	R206	
BZC1494	R202, R203, R503	
BZC1495	R501	
BZC1496	R504	
BZC1649	R116	
BZC1747	R102	
BZC1748	R103	
BZC1750	R112, R204, R602	
BZC1752	R114	
BZC1753	R604	
BZC1754	R214	
BZC1756	R402	
BZC1757	R210, R603, R608	
BZC1758	R606	
BZC1934	R105	
BZC1935	R106	
BZC1936	R215	
BZC1937	R506, R611	
BZC1952	R216	
ICN-025	R104	
ICN-046	R403	
ICN-057	R208	

[OTHER]

Part No.	Description	Remark
BZK1274	CN101 MINI JACK	

NON-SERVICE-PARTS

[COILS]

Part No.	Description	Remark
BZT1001	L603, L607 AIR-CORE COIL	
BZT1002	L102, L401 AIR-CORE COIL	
BZT1003	L103, L105, L204 AIR-CORE COIL	
BZT1005	L501 AIR-CORE COIL	
BZT1245	L110 AIR-CORE COIL	
BZT1294	L202 RESONANCE BAR	
BZT1295	L504 RESONANCE BAR	
BZT1297	L406 RESONANCE BAR	
BZT1298	L400 RESONANCE BAR	
BZT1300	L104, L108, L205 AIR-CORE COIL	
BZT1301	L207 AIR-CORE COIL	
BZT1302	L301 AIR-CORE COIL	
BZT1303	L302 AIR-CORE COIL	
BZT1305	L601 AIR-CORE COIL	
BZT1312	L117 AIR-CORE COIL	
BZT1376	L112, L605 AIR-CORE COIL	
BZT1377	L208 AIR-CORE COIL	
BZT1380	L503 AIR-CORE COIL	
BZT1421	L403 RESONANCE BAR	
BZT1422	L408, L409 RESONATOR BAR	
BZT1423	L107, L109, L120, L206 AIR-CORE COIL	
BZT1424	L303 AIR-CORE COIL	
BZT1429	L407 AIR-CORE COIL	
BZT1430	L502 AIR-CORE COIL	
BZT1431	L602 AIR-CORE COIL	
BZT1495	L101 AIR-CORE COIL	
BZT1496	L113 AIR-CORE COIL	
BZT1497	L114 AIR-CORE COIL	
BZT1498	L116 AIR-CORE COIL	
BZT1499	L119 AIR-CORE COIL	
BZT1500	L121 AIR-CORE COIL	
BZT1501	L606 AIR-CORE COIL	

[OTHERS]

Part No.	Description	Remark
BZA1169	NAME LABEL	
BZA1190	LABEL	
BZK1301	RCA PIN CONNECTOR	
BZN1309	COVER R	
BZN1312	SHIELD COVER C	
BZN1373	SHIELD COVER B	
BZN1530	FRAME WITH F-TYPE CONNECTOR	
BZN1531	SHIELD COVER A	
BZN1614	COVER F	

5.2 MAIN ASSEMBLY

AC POWER ASSEMBLY (BWZ1192)

[SEMICONDUCTORS]

Part No.	Description	Remark
1SS252	D801 DIODE	

[RELAYS]

Part No.	Description	Remark
ASR1024	RY801 RELAY	⚠

[COILS/TRANSFORMERS]

Part No.	Description	Remark
ATT1130	T801 POWER TRANSFORMER	⚠

[RESISTORS]

Part No.	Description	Remark
ACG1029	CR801, 802	⚠

NON-SERVICE-PARTS

[OTHERS]

Part No.	Description	Remark
AKT1023	CABLE HOLDER	

AC OUTLET ASSEMBLY (BWZ1193)

[OTHERS]

Part No.	Description	Remark
BKP-030	AC OUTLET	⚠

RECEIVER ASSEMBLY (BWZ1249)

[OTHERS]

Part No.	Description	Remark
AXX1023	REMOTE RECEIVER UNIT	

CONTROL ASSEMBLY (BWZ1250)

[SEMICONDUCTORS]

Part No.	Description	Remark
LA7770	IC101 FSK RECEIVER IC	
LA7710	IC201	
CXA1110BS	IC202 TV IC	
M5237L	IC301, 302	
PD0065C	IC402	

Part No.	Description	Remark
M6M80011AP	IC403 E-EPROM IC	
2SC2786	Q101 TRANSISTOR	
2SC2216	Q201 TRANSISTOR	
2SC2458	Q202-205 TRANSISTOR	
2SA1048	Q206 TRANSISTOR	
2SC2458	Q207 TRANSISTOR	
2SC2458	Q209, 210 TRANSISTOR	
2SC2216	Q211 TRANSISTOR	
XDC124ES	Q212 TRANSISTOR	
2SC2458	Q301 TRANSISTOR	
2SB1375	Q302, 303 TRANSISTOR	
2SC1318	Q304 TRANSISTOR	
2SC2458	Q401-403 TRANSISTOR	
2SC1318	Q404-408 TRANSISTOR	
DTA123JS	Q409-416 TRANSISTOR	
2SC2458	Q417 TRANSISTOR	
2SC1318	Q418 TRANSISTOR	
2SC2458	Q419 TRANSISTOR	
2SK246	Q601 N-FET	
2SC2458	Q602 TRANSISTOR	
1SS110	D201-204 DIODE	
1SS252	D205-208 DIODE	
1SS252	D213 DIODE	
1SR139-400	D301 DIODE	
HZ30EB3	D303 ZENER DIODE	
4D4B44	D304 DIODE	
1SR139-400	D308-312 DIODE	
RD7.5ESB2	D401 ZENER DIODE	
1SS252	D402-406 DIODE	
UZ-6.2BS	D407-416 ZENER DIODE	
1SR139-400	D417 DIODE	
BEL1008	D418 LED INDICATOR	

[COILS/TRANSFORMERS]

Part No.	Description	Remark
BTE1013	L1, 2 COIL	
ATC-226	L3 COIL	
ATG1039	L4 COIL	
LAU100K	L104 AXIAL INDUCTOR	
BTH1017	L201 AXIAL INDUCTOR	
ATH-098	L202 INDUCTOR	
LAU120J	L203 AXIAL INDUCTOR	
LAU101K	L204 AXIAL INDUCTOR	
BTH1018	L205 AXIAL INDUCTOR	
LAU6R8K	L601 AXIAL INDUCTOR	
BTH-097	L602 FIXED COIL	
LAUR33M	L604 AXIAL INDUCTOR	
BTE1009	T1 RF TRANSFORMER	
BTE1010	T2 RF TRANSFORMER	
BTE1011	T3 RF TRANSFORMER	
BTE1012	T4 RF TRANSFORMER	
BTF-012	F101 CERAMIC FILTER	
BTF1005	F102 CERAMIC FILTER	
ATF1111	F202 SAW FILTER	
ATF-166	F203 CERAMIC FILTER	
BTF1007	F204 CERAMIC TRAP	

[CAPACITORS]

Part No.	Description	Remark
BCG1001	C101 CERAMIC CAPACITOR	
BCG-020	C102 CERAMIC CAPACITOR	
BCG1001	C103 CERAMIC CAPACITOR	
CKDYB222K50	C104 CERAMIC CAPACITOR	
CCDCH220J50	C105 CERAMIC CAPACITOR	
CKDYB472K50	C106 CERAMIC CAPACITOR	
CCCCH330J50	C107 CERAMIC CAPACITOR	
CKDYB102K50	C108 CERAMIC CAPACITOR	
CQMA104J50	C109 MYLAR FILM CAPACITOR	
CCCSL221J50	C110 CERAMIC CAPACITOR	
CKMYB471K50	C111 CERAMIC CAPACITOR	
CQMA104J50	C112 MYLAR FILM CAPACITOR	
CKMYB471K50	C113 CERAMIC CAPACITOR	
CCMCH150J50	C114, 115 CERAMIC CAPACITOR	
CKMYB102K50	C116, 117 CERAMIC CAPACITOR	
CKDYF473Z50	C119, 120 CERAMIC CAPACITOR	
CCCCH050C50	C121 CERAMIC CAPACITOR	
CKDYF103Z50	C122 CERAMIC CAPACITOR	
CKPUYF103Z25	C123 CERAMIC CAPACITOR	
CEAS100M50	C124 ELECTR. CAPACITOR	
CKMYB102K50	C126, 127 CERAMIC CAPACITOR	
CCDCH560J50	C128 CERAMIC CAPACITOR	
CKPUYB102K50	C201 CERAMIC CAPACITOR	
CCCSL121J50	C202 CERAMIC CAPACITOR	
CCMSL121J50	C203, 204 CERAMIC CAPACITOR	
CCCSL221J50	C205 CERAMIC CAPACITOR	
CCCSL121J50	C206, 207 CERAMIC CAPACITOR	
CKDYB102K50	C208 CERAMIC CAPACITOR	
ACG1021	C210 CERAMIC CAPACITOR	
CKPUYF103Z25	C213 CERAMIC CAPACITOR	
CEAS2R2M50	C214 ELECTR. CAPACITOR	
CKPUYF103Z25	C216, 217 CERAMIC CAPACITOR	
CEAS220M25	C218 ELECTR. CAPACITOR	
CEAS100M50	C219 ELECTR. CAPACITOR	
CEAS010M50	C220 ELECTR. CAPACITOR	
CCDSL181J50	C221 CERAMIC CAPACITOR	
CEAS010M50	C222 ELECTR. CAPACITOR	
CCCCH680J50	C223 CERAMIC CAPACITOR	
CCCCH101J50	C224 CERAMIC CAPACITOR	
CCCSL330J50	C225 CERAMIC CAPACITOR	

Part No.	Description	Remark
CKDYB102K50	C226 CERAMIC CAPACITOR	
CEAS101M16	C227 ELECTR. CAPACITOR	
CCCCH101J50	C228 CERAMIC CAPACITOR	
CEANP4R7M35	C229 ELECTR. CAPACITOR	
CCCCH101J50	C230 CERAMIC CAPACITOR	
CKPUYF103Z25	C231 CERAMIC CAPACITOR	
CEAS100M50	C232 ELECTR. CAPACITOR	
CKPUYB102K50	C233-235 CERAMIC CAPACITOR	
CGMYX103M16	C236 CERAMIC CAPACITOR	
CCPUCH120J50	C237 AXIAL CERAMIC C.	
CKCYB331K50	C238 CERAMIC CAPACITOR	
CEAS100M50	C239 ELECTR. CAPACITOR	
CCCCH150J50	C240 CERAMIC CAPACITOR	
CKMYB102K50	C241 CERAMIC CAPACITOR	
CKCYB102K50	C242 CERAMIC CAPACITOR	
CEAS470M25	C243 ELECTR. CAPACITOR	
CEAS100M50	C244 ELECTR. CAPACITOR	
CEAS4R7M50	C245, 246 ELECTR. CAPACITOR	
CEAS101M16	C247 ELECTR. CAPACITOR	
CKCYF103Z50	C248 CERAMIC CAPACITOR	
CKPUYF103Z25	C249 CERAMIC CAPACITOR	
CKCYF103Z50	C250 CERAMIC CAPACITOR	
CKDYF103Z50	C251 CERAMIC CAPACITOR	
CEAS100M50	C252 ELECTR. CAPACITOR	
CKCYF103Z50	C253 CERAMIC CAPACITOR	
CKPUYF103Z25	C254, 255 CERAMIC CAPACITOR	
ACG1021	C256 CERAMIC CAPACITOR	
CKPUYF103Z25	C257 CERAMIC CAPACITOR	
CKPUYB102K50	C261 CERAMIC CAPACITOR	
CKDYF103Z50	C262 CERAMIC CAPACITOR	
CCDTH270J50	C263 CERAMIC CAPACITOR	
CCMCH050C50	C264 CERAMIC CAPACITOR	
CCDSH680J50	C265 CERAMIC CAPACITOR	
CCDSH151J50	C266 CERAMIC CAPACITOR	
CCDCH020C50	C267 CERAMIC CAPACITOR	
CCDCH070D50	C268 CERAMIC CAPACITOR	
CKPUYB102K50	C269 CERAMIC CAPACITOR	
CKPUYB102K50	C271 CERAMIC CAPACITOR	
CCMCH050C50	C280 CERAMIC CAPACITOR	
CEAS101M63	C301 ELECTR. CAPACITOR	
CEAS100M50	C304 ELECTR. CAPACITOR	
CKCYF103Z50	C305 CERAMIC CAPACITOR	
CEHAQ222M25	C306 ELECTR. CAPACITOR	
CKCYF103Z50	C307 CERAMIC CAPACITOR	
CEHAQ100M50	C308 ELECTR. CAPACITOR	
CEHAQ101M16	C309 ELECTR. CAPACITOR	
CKPUYF103Z25	C310 CERAMIC CAPACITOR	
CEHAQ222M16	C311 ELECTR. CAPACITOR	
CKCYF103Z50	C312 CERAMIC CAPACITOR	
CKCYB102K50	C313 CERAMIC CAPACITOR	

Part No.	Description	Remark
CEAS101M10	C314 ELECTR. CAPACITOR	
CKCYF103Z50	C315 CERAMIC CAPACITOR	
CFTXA224J50	C401 AUDIO FILM CAPACITOR	
CQMA823J50	C402 MYLAR FILM CAPACITOR	
CQMA104J50	C403 MYLAR FILM CAPACITOR	
CKPUYF103Z25	C404 CERAMIC CAPACITOR	
CEANL220M16	C405 ELECTR. CAPACITOR	
CKDYF103Z50	C406 CERAMIC CAPACITOR	
CEANL100M16	C407 ELECTR. CAPACITOR	
CCCCH180J50	C408, 409 CERAMIC CAPACITOR	
CKCYF473Z50	C410, 411 CERAMIC CAPACITOR	
CKDYF103Z50	C412 CERAMIC CAPACITOR	
CKPUYF103Z25	C414, 415 CERAMIC CAPACITOR	
CGMYX103M16	C601, 602 CERAMIC CAPACITOR	
CEAS100M25	C603 ELECTR. CAPACITOR	
CQMA473J50	C604 MYLAR FILM CAPACITOR	
CQMA154J50	C605 MYLAR FILM CAPACITOR	
CEAS100M50	C606 ELECTR. CAPACITOR	
CCMCH470J50	C607 CERAMIC CAPACITOR	
CEAS470M25	C608 ELECTR. CAPACITOR	
CGMYX103M16	C609 CERAMIC CAPACITOR	
CEAS220M16	C610 ELECTR. CAPACITOR	
CQMA223J50	C611 MYLAR FILM CAPACITOR	
CEAS101M50	C612 ELECTR. CAPACITOR	
CCMCH050C50	C613 CERAMIC CAPACITOR	
CEAS100M50	C614 ELECTR. CAPACITOR	
CCDCH560J50	C615 CERAMIC CAPACITOR	
CKPUYF103Z25	C616 CERAMIC CAPACITOR	
CKPUYB102K50	C617, 618 CERAMIC CAPACITOR	

[RESISTORS]

Part No.	Description	Remark
RD1/8PM□□□J	R101-112 CARBONFILM RESISTOR	
RD1/8PM□□□J	R114-116 CARBONFILM RESISTOR	
RD1/8PM□□□J	R201-205 CARBONFILM RESISTOR	
BCN-012	R206 METALFILM RESISTOR	
BCN1010	R207 METALFILM RESISTOR	
RN1/4PC□□□□F	R208, 209 METALFILM RESISTOR	
BCN-012	R210 METALFILM RESISTOR	
BCN1010	R211 METALFILM RESISTOR	
RD1/8PM□□□J	R212-241 CARBONFILM RESISTOR	
RD1/8PM□□□J	R243-250 CARBONFILM RESISTOR	
RN1/4PC□□□□F	R251 METALFILM RESISTOR	
RD1/8PM□□□J	R252, 253 CARBONFILM RESISTOR	
RD1/8PM□□□J	R255-274 CARBONFILM RESISTOR	
RD1/8PM□□□J	R276 CARBONFILM RESISTOR	
RD1/8PM□□□J	R279-281 CARBONFILM RESISTOR	
RD1/8PM□□□J	R284 CARBONFILM RESISTOR	
RD1/8PM□□□J	R287, 288 CARBONFILM RESISTOR	
RD1/8PM□□□J	R301-307 CARBONFILM RESISTOR	
RN1/4PC□□□□F	R308 METALFILM RESISTOR	
RD1/8PM□□□J	R309, 310 CARBONFILM RESISTOR	

Part No.	Description	Remark
RD1/8PM□□□J	R312, 313 CARBONFILM RESISTOR	
RN1/4PC□□□□F	R314 METALFILM RESISTOR	
RD1/8PM□□□J	R315, 316 CARBONFILM RESISTOR	
RD1/8PM□□□J	R401-417 CARBONFILM RESISTOR	
RA6S□□□J	R418 RESISTOR ARRAY (10K)	
RD1/8PM□□□J	R419-441 CARBONFILM RESISTOR	
RD1/2PM□□□J	R442 CARBONFILM RESISTOR	
RD1/8PM□□□J	R443-449 CARBONFILM RESISTOR	
RD1/8PM□□□J	R601-610 CARBONFILM RESISTOR	
ACP1045	VR1 VR	
ACP1040	VR2 VR	
ACP1045	VR3 VR	
ACP1040	VR5 VR	

[OTHERS]

Part No.	Description	Remark
BKH1002	SOCKET	
BWE1030	CONVERTER ASSEMBLY	
BWX1018	RE MODULATOR	
PBZ30P080FMC	SCREW	
ERZ-C10DK220	VA401 VARISTOR	
BSS1002	X101 SAW RESONATOR	
ASS1046	X401 SAW RESONATOR	

NON-SERVICE-PARTS

[COILS]

Part No.	Description	Remark
BTH1007	L103 AIR-CORE COIL	
BTH1012	L603 AIR-CORE COIL	

[OTHERS]

Part No.	Description	Remark
AKT1023	CABLE HOLDER	
ANK-138	EARTH PLATE	
ANK-142	EARTH PLATE	
BNG1071	RECEIVER HOLDER	
BNH1010	HEAT SINK	
BNK1010	FSK SHIELD CASE	
BNK1011	FSK SHIELD COVER(UPPER)	
BNK1012	FSK SHIELD COVER(LOWER)	
BNK1033	DSCR SHIELD CASE	
BNK1034	DSCR SHIELD COVER(UPPER)	
KM250MA11	PLUG(11P)	
ZX-009	WIRE	
AKP1070	CN1 CONNECTOR(10P)	
D15A09-125-2651	J1 JUMPER WIRE	
DHH03-150-2651	J2 JUMPER WIRE	

5.3 CABLE RETURN ASSEMBLY (BWX103

● BA-6310C ONLY

[SEMICONDUCTORS]

Part No.	Description	Remark
LM7001	IC501 PLL IC	
2SA1048	Q506 TRANSISTOR	
2SC1318	Q503 TRANSISTOR	
2SC2026	Q508 TRANSISTOR	
2SC2216	Q507 TRANSISTOR	
2SC2458	Q501, Q502, Q504, Q505 TRANSISTOR	
2SK161	Q510, Q511 N-FET	
2SK246	Q509 N-FET	
HSK277	D504, D505 DIODE	
RD6.2LB2	D501 ZENER DIODE	
SVC203CP	D502, D503 VARI-CAP DIODE	

[COILS, FILTERS]

Part No.	Description	Remark
ATH1047	L502 TIP COIL	
ATH1048	L501 TIP COIL	
ATH1049	L503-L505 TIP COIL	
BTH1020	L506 COIL	
ATF1087	F502 LOW-PASS FILTER	
BTF1017	F501 LOW-PASS FILTER	

[CAPACITORS]

Part No.	Description	Remark
CCSQCH040C50	C507 CHIP CAPACITOR	
CCSQCH101J50	C513, C525 CHIP CAPACITOR	
CCSQCH120J50	C506, C508 CHIP CAPACITOR	
CCSQCH121J50	C520-C522 CHIP CAPACITOR	
CCSQCH330J50	C526 CHIP CAPACITOR	
CCSQCH680J50	C512, C515, C519 CHIP CAPACITOR	
CEANP100M16	C533 ELECTR. CAPACITOR	
CEAS100M50	C501 ELECTR. CAPACITOR	
CEAS101M10	C534 ELECTR. CAPACITOR	
CEAS470M25	C535 ELECTR. CAPACITOR	
CFTXA105J50	C503 AUDIO FILM CAPACITOR	
CFTXA474J50	C504 AUDIO FILM CAPACITOR	
CKSQYF103Z50	C502, C505, C509-C511, C514, C516-C518, C523, C524, C527-C530, C532 CHIP CAPACITOR	

[RESISTOR]

Part No.	Description	Remark
RS1/10S□□□J	ALL CHIP RESISTORS	

[OTHERS]

Part No.	Description	Remark
ASS1051	X501 CRYSTAL RESONATOR(8MHz)	
ADE1101	J502 COAXIAL LINE(WITH TMP PLUG)	
BDX1049	J501 WIRE (11P)	

NON-SERVICE-PARTS

[OTHERS]

Part No.	Description	Remark
AKT1007	CABLE HOLDER	
BNK1018	CASE	
BNK1019	COVER	
BNK1020	PARTITION PLATE	
BNP1080	P. C. BOARD	

6. ADJUSTMENTS

6.1 CONVERTER ASSEMBLY (BWE1030)

- These adjustments are performed with the converter assembly connected to the main assembly. Before beginning adjustments, the converter assembly is removed from the main assembly board and reconnected by jumper wires. (Refer to Fig. 1.)
- These adjustments are performed with the outer cover removed and the shield cover attached to the converter assembly. However, the 2nd local OSC is adjusted only after attaching and fastening the outer cover.

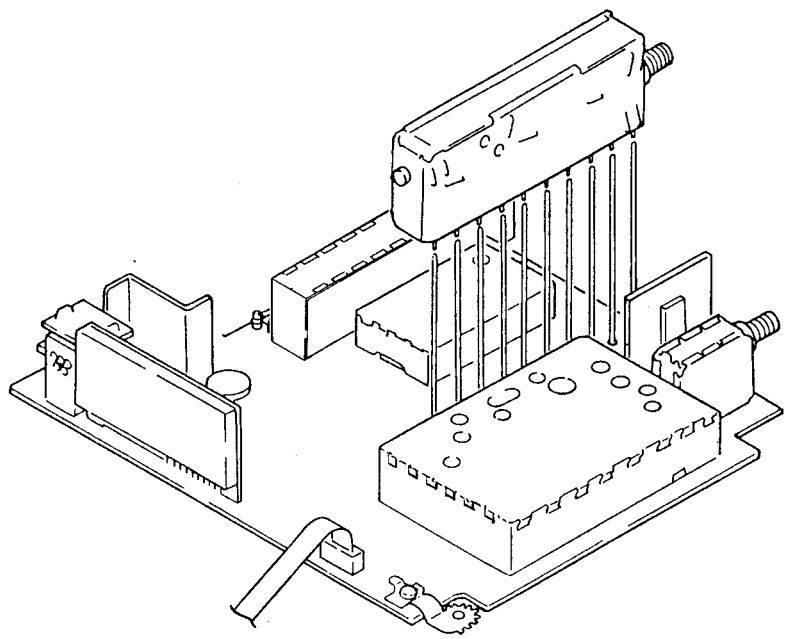


Fig. 1 Connection Method

1. 1st Local OSC Adjustment

1. Confirm that the voltage is approximately between 1.5V DC (CH.2) to 25V (CH.86) at the Vt terminal of the converter. (Fig. 2)
   If the voltage is not correct, adjust L201 by moving it away from L202. (Fig. 3)

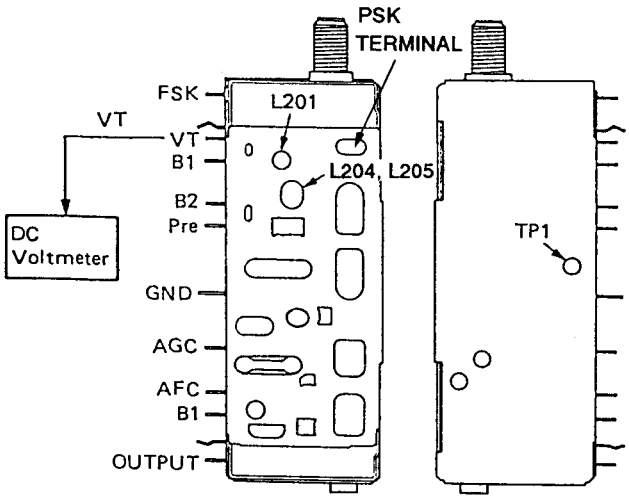


Fig. 2

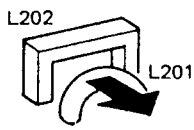


Fig. 3

2. 1st MIXER Adjustment

1. Confirm that the mixing voltage level is 1V DC (CH.86) to 3V (CH.2) at TP1. (Fig. 2)
   If the voltage is not correct, adjust L205 by separating the coil windings. If the adjustment can not be performed with L205, adjust L204 by separating the coil windings. (Fig. 4)
   However, when the coil windings are separated, the voltage will have a tendency to increase.

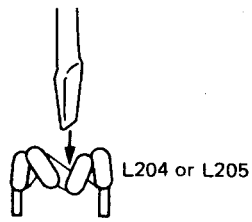


Fig. 4

3. 1st IF Adjustment

1. After connecting an OUTPUT PAD (Fig. 5) to TP2, tune the unit to CH.2. Apply 7V DC to the AGC terminal, and connect TP3 to ground through a 1000 (pF) capacitor. (Fig. 6)

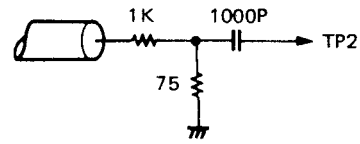


Fig. 5

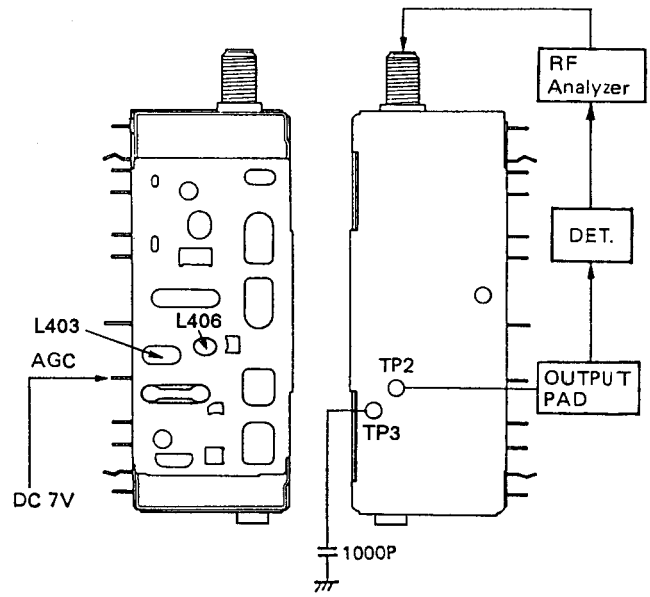


Fig. 6

2. Connect the RF signal from the output to the INPUT connector.
3. Confirm that the oscillation frequency of 2nd Local OSC is 567MHz.
4. Adjust L403 and L406 for maximum gain and for the waveform shown in Fig. 7.

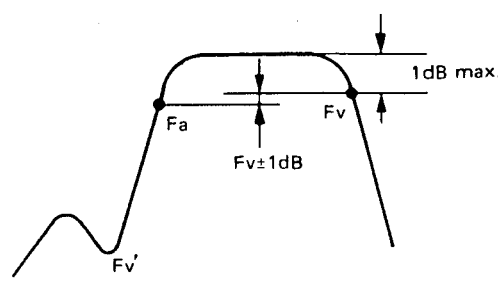


Fig. 7

4. Output Wave Adjustment

Perform this adjustment after completing the 1st IF adjustment.

1. Tune the unit to CH.2, and input an RF signal from the Wiltron to the INPUT terminal. Remove the jumper wire from the AGC terminal at this time, and apply 7V DC to the AGC terminal from the DC power supply. (Fig. 8)
2. Adjust L602, L603, L605 and L606 by the following procedure, and set the waveform at the OUTPUT terminal of the converter as shown in Fig. 9.
   a) Adjust L606 for the proper gain at ① (23 to 30dB).
   b) Adjust L605 so that ② has the same level as ①.
   c) Readjust L605 and L606 to make ③ level (from Fv to Fv–4.5MHz) to within 1dB.
   d) Adjust L603 so that ⑤ is less than –8dB.
   e) Adjust L602 so that ④ is less than –14dB.

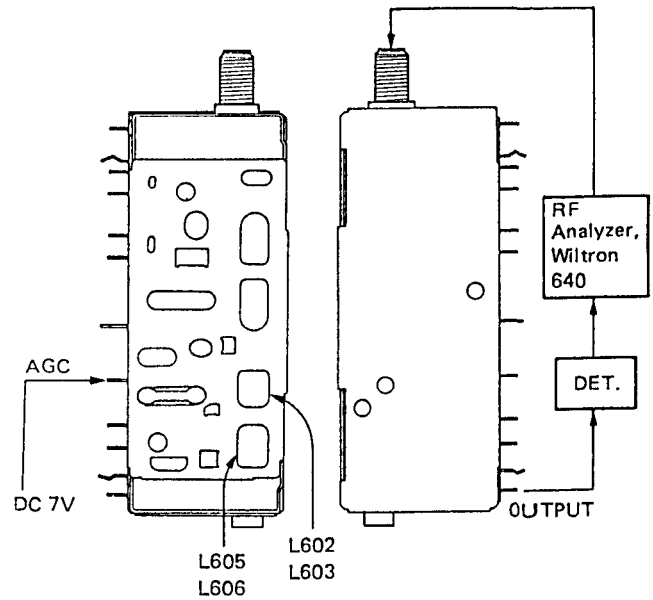


Fig. 8

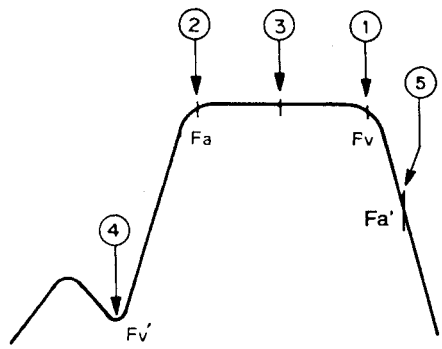


Fig. 9

5. 2nd Local OSC Adjustment

1. Attach the outer cover and fasten.
2. Tune the unit to CH.2, and apply a 55.25MHz (Fv) signal from a signal generator to the INPUT terminal. Remove the jumper wire from the AFC terminal at this time, and apply 4V DC from the DC power supply to the AFC terminal. (Fig. 10)
3. Adjust L505 for a reading of 45.75MHz ± 50kHz on the frequency counter.

6. Confirmation of Output Wave

1. Confirm that the output waveform remains the same (Fig. 9) after completing the 2nd Local OSC Adjustment. If it varies from the specifications, remove the front cover and again perform "4. Output Wave Adjustment".

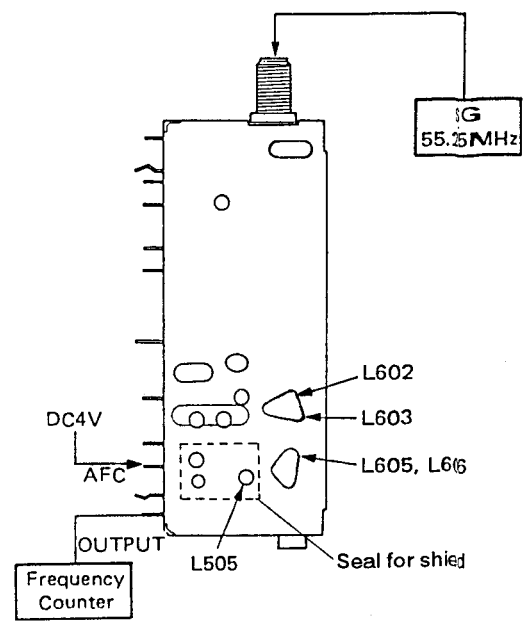


Fig. 10

6.2 MAIN ASSEMBLY (BWM1100)

1. FSK Section (Fig. 11)

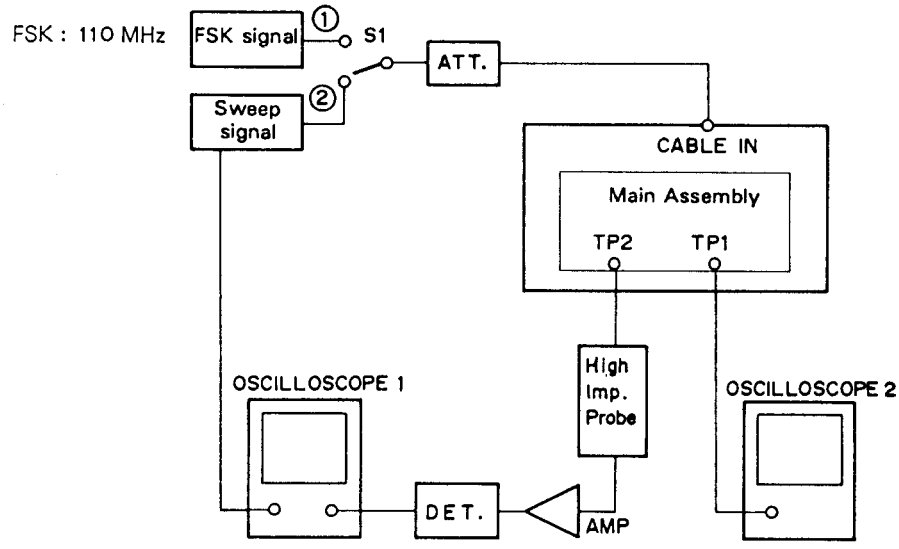


Fig. 11 Connection Diagram

(1) Adjustment of Input Filter

a. Set S1 to position ② and connect the High Impedance Probe to TP2.
b. Apply a sweep wave (+10dBmV, 108 to 112MHz) to the CABLE IN terminal.
c. While observing the waveform on oscilloscope 1, adjust L1 and L2 so that the U-curve is at maximum level and there is left and right symmetry.
d. Be sure to disconnect the probe from TP2 after completing this adjustment.

(2) Adjustment of Muting Level

a. Set S1 to position ① and apply the FSK signal to the CABLE IN terminal.
b. Adjust VR1 while observing the waveform on oscilloscope 2.
Adjust so that the demodulated wave appears steady when the input FSK signal level is at -23dBmV, and goes to a steady +5V DC when the level is changed to -28dBmV.

(3) Confirmation of Sensitivity

a. Set S1 to position ① and apply a -21dBmV FSK signal to the CABLE IN terminal.
b. Confirm that the jitter is less than 5% by observing the demodulated FSK wave on oscilloscope 2.
Jitter [%] = (t/T) × 100
(Refer to Fig. 12)

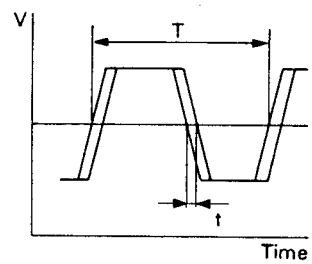


Fig. 12 Jitter

(4) Confirmation of Data Output

a. Set S1 to position ① and apply a -7dBmV FSK signal to the CABLE IN terminal.
b. Confirm that the duty cycle is 50 ± 3% by observing the demodulated FSK wave on oscilloscope 2.
Duty cycle [%] = (t/T) × 100
(Refer to Fig. 13)

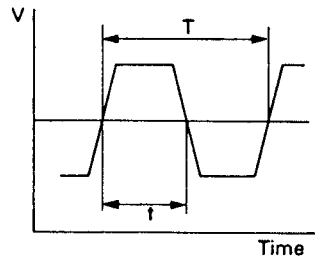


Fig. 13 Duty Cycle

2. Descrambler Section (Fig. 14)

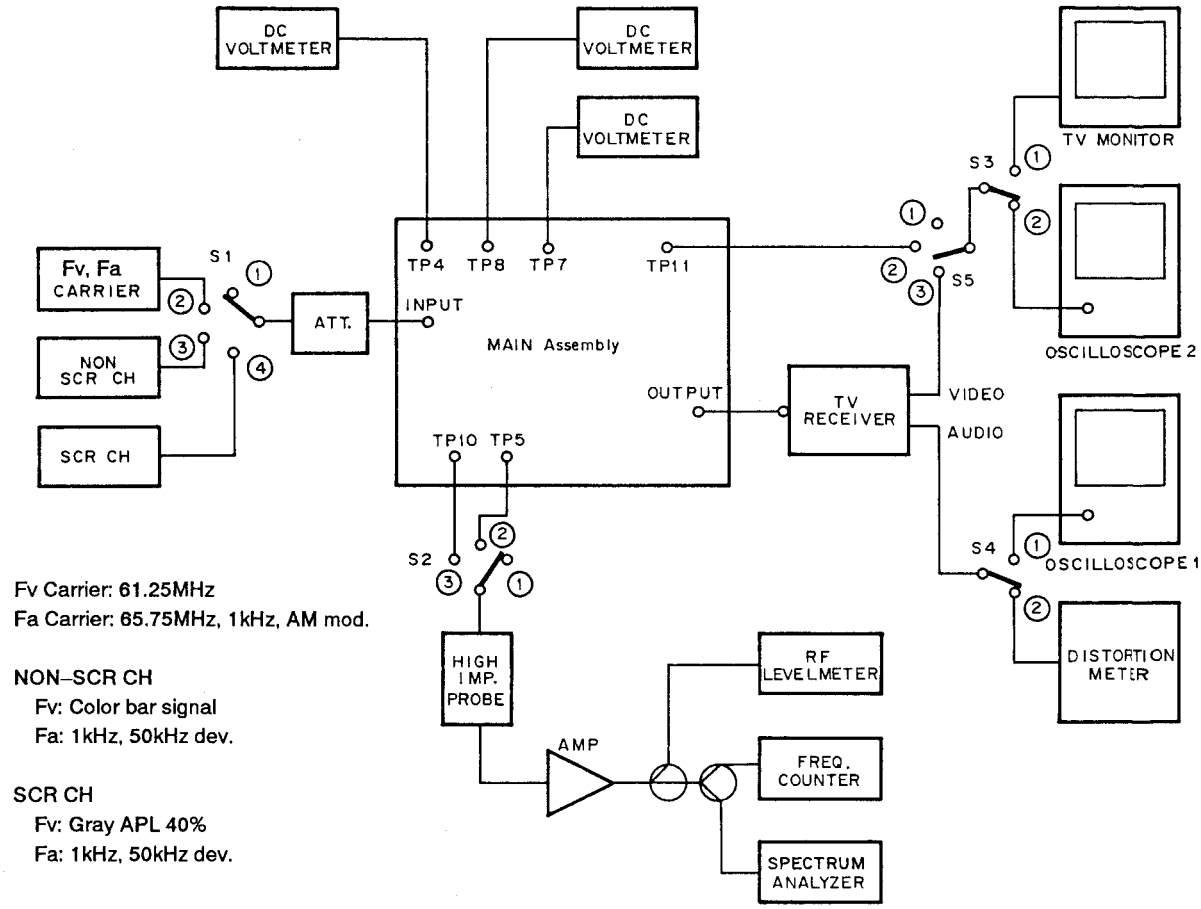


Fig. 14 Connection Diagram

- Read the address of the converter with the prescribed bar-code reader connected with ERROR RESETTER BX-2013.
  Send the converter the down-stream command of CH MODE, STD 550MHz, ALL CHANNEL RECEPTION and OUTPUT CHANNEL 3 with the converter's individual address.
- Tune the TV receiver to channel 3.
- Wait for at least one minute after applying power before making any adjustments.

(1) AFT Adjustment

a. Set S1 to position ② and S2 to position ③ and apply a +5dBmV Fv carrier signal to the CABLE INterminal.
b. Tune the converter to ch.3 and rotate VR2 fully counterclockwise.
c. Rotate T2 clockwise to find the point where the TP7 voltage changes from approximately 2V to 7V.
   Set T2 to approximately 4.5V in the vicinity of the mid point.
d. Fine tune T2 so that the TP10 frequency becomes 45.75MHz ± 10kHz.
e. Set S2 to position ① after completion of adjustment.

(2) Audio Trap Adjustment

a. Set S1 and S2 to position ②, and apply +10dBmV Fv carrier and -5dBmV Fa carrier to the INPUTterminal.
b. Adjust L3 so that Fa carrier (41.25MHz) on the spectrum analyzer becomes minimum.

(3) VCO Adjustment

a. Set S1 to position ③, S3 and S5 to position ②, and apply a +5dBmV NON-SCR signal to the INPUT terminal.
b. Set VR5 to center position and adjust T1 so that the signal appears on oscilloscope 2 as shown in Fig. 15.
c. Adjust T1 so that the waveform of +Q section of the color bar becomes Fig. 15 (b).

Note:

When the VCO adjustment is extremely bad, white scratch noise will appear over the entire screen or the picture will not appear at all. If this condition occurs, remove the signal from the INPUT terminal and connect high impedance probe to TP5. Adjust T1 so that the frequency counter reads 23.5MHz ± 100kHz. Move the probe back to TP10 and continue with step a.

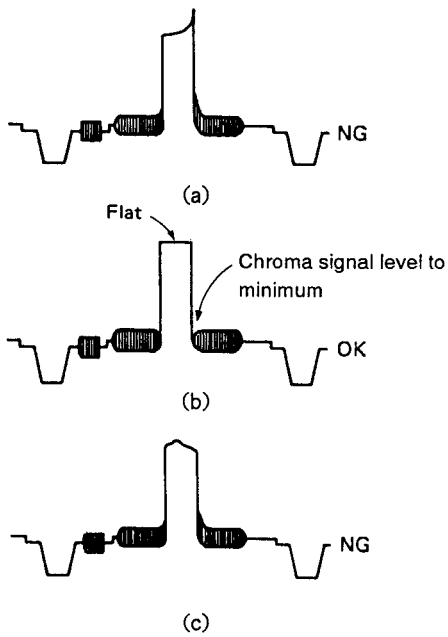


Fig. 15 Video Output Waveform (+Q section)

(4) Fa Detection Coil Adjustment

a. Set S1 to position ④ and apply a +5dBmV SCR signal (Fa: 1kHz AM mod.) to the INPUT terminal.
b. Adjust T4 and L4 alternately so that the TP4 voltage becomes maximum.

(5) AGC Adjustment

a. Set S1 to position ③ and apply a +2dBmV non-scrambled signal to the INPUT terminal.
b. Adjust VR2 to the position where the TP8 voltage (approximately 7V) is reduced by 0.1V.
c. Next, change the level of the signal at the INPUT terminal to +15dBmV and confirm that the TP8 voltage is less than 5.0V.

(6) Audio Detection Coil Adjustment

a. Set S1 to position ③ and S4 to position ①, and apply a +5dBmV non-scrambled signal to the INPUT terminal. Set VR3 to the center position.
b. Adjust T3 so that 1kHz sin-wave is maximum level and its distortion is minimum on oscilloscope 1.
c. Set S1 to position ④ and S4 to position ②, and apply a +5dBmV SCR signal to the INPUT terminal.
d. Fine tune T3 so that the distortion meter indicates minimum level.

(7) Audio Deviation Adjustment

a. Set S4 to position ① and apply a +5dBmV NON-SCR signal to TV receiver directly. Measure the audio level on oscilloscope 1.
b. Set S1 to position ③ and S4 to position ①, and apply a +5dBmV non-scrambled signal to the INPUT terminal.
c. Set the LED volume indication to "V 50".
d. Adjust VR3 to make the difference between the audio level on oscilloscope 1 and the level measured in step a. to 2% or less.

(8) Video Modulation Adjustment

a. Apply a +5dBmV non-scrambled signal directly to the TV Receiver Input terminal.
b. Set S5 to ③ and S3 to ②. Adjust the vertical scale of Oscilloscope 2 so that the White Bar level of the EIA color bar signal spans 7 vertical graticules as shown in Fig. 16. Disconnect the direct signal connection to the TV Receiver.
c. Set S1 to ③, S5 to ③, S3 to ② and apply a +5dBmV non-scrambled signal to the Main Assembly INPUT terminal.
d. Adjust VR5 so the White Bar level spans 6.5 ± 0.1 vertical graticules on Oscilloscope 2.

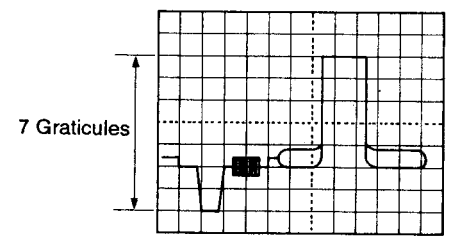


Fig. 16 Video Output Waveform (+Q section)

7. CIRCUIT DESCRIPTIONS

7.1 CONVERTER ASSEMBLY (BWE1030)

1. Outline (Fig. 1)

The converter assembly selects any desired TV frequency between 54MHz through 552MHz which are transmitted downstream, through the cable system, from the CATV center. The converter assembly then converts the selected frequency to an intermediate frequency (IF) signal of Fv=45.75MHz and Fa=41.25MHz, for further processing.

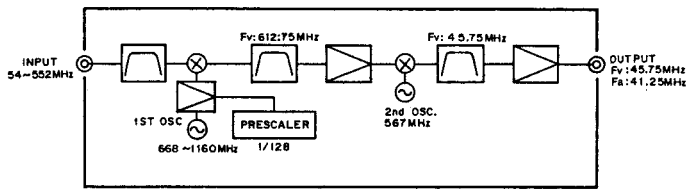


Fig. 1 Block Diagram

2. Input Filter (Fig. 2)

The input filter is composed of the FSK branching and shift filter sections.

The FSK branching section is a 90MHz to 130MHz band width filter which extracts the FSK signal from the composite input cable signals and routes the signal to the Main Assembly FSK section.

Characteristics of the shift filter are to have a high band cut off of the selected frequency and to eliminate undesirable out of band signals. Also, this filter suppresses the frequency components generated by the local oscillator/mixer circuits from feeding back into the input circuit. The upstream RF signal, which is FSK–modulated in the cable return assembly, is input to the upstream FSK terminal (CN101) and then transmitted to CABLE center via IN terminal.

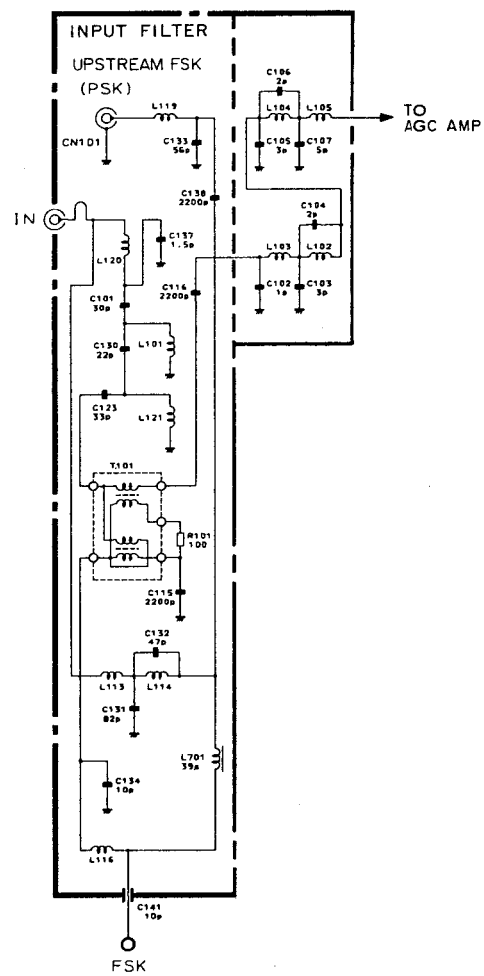


Fig. 2 Input Filter

3. AGC Circuit (Fig. 3)

The AGC circuit which consists of pin diodes and control amplifiers alters the amount of signal attenuation using the AGC voltage from the main assembly IC202. The attenuation section of the shift filter consists of components L110, D101 and D102.

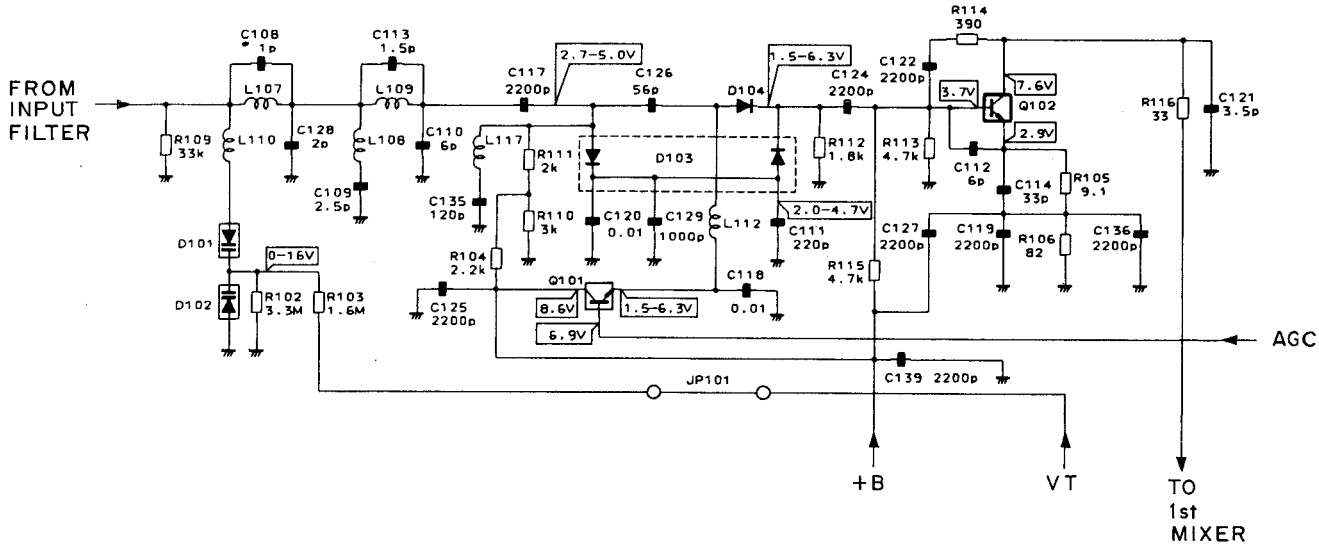


Fig. 3 AGC Circuit

4. 1st Local Oscillator (Fig. 4)

The 1st local oscillator is an electronic tuning circuit incorporating a varactor diode (D201). This circuit selects a desired channel by varying the oscillator frequency, 668MHz through 1160MHz, using a tuning voltage (VT) applied to the varactor diode. The VT originates at the PLL circuit of the main assembly.

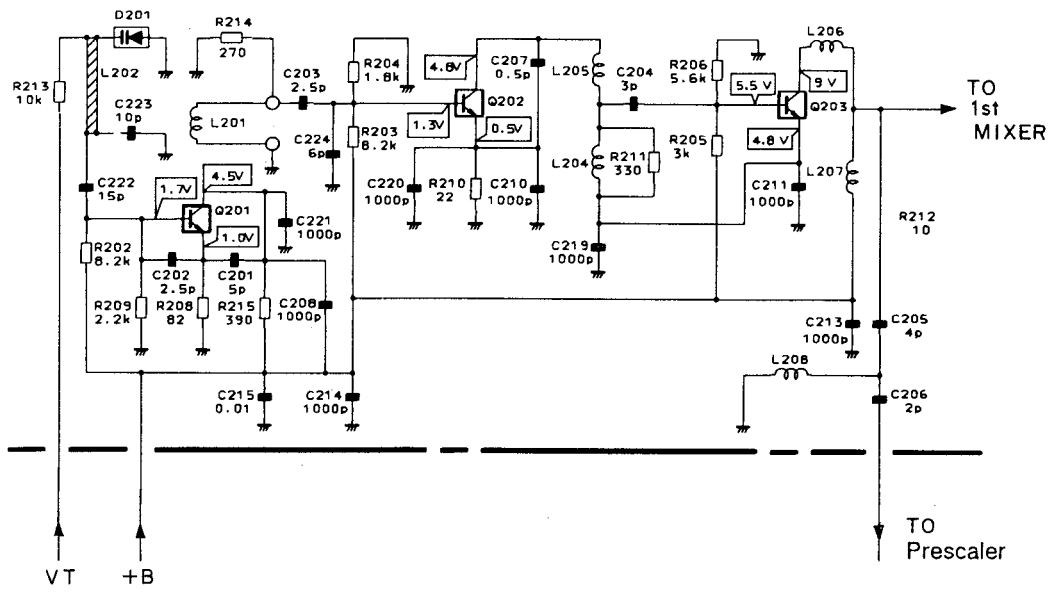


Fig. 4 1st Local Oscillator

5. 1st Mixer (Fig. 5)

The 1st mixer, consists of four diodes (D301 and D302), is a double balanced mixer. It converts the TV signal from the input terminal and the signal from the 1st local oscillator by mixing them to get the fixed IF frequency (Fv=612.75MHz).

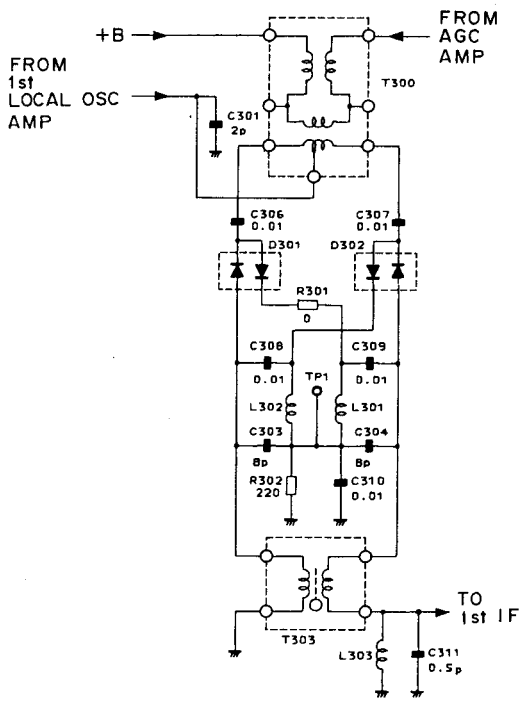


Fig. 5 1st Mixer

6. Prescaler (Fig. 6)

The signal supplied to IC201 from the 1st local oscillation amplifier is divided by 64 and routed to the PLL section of the main assembly.

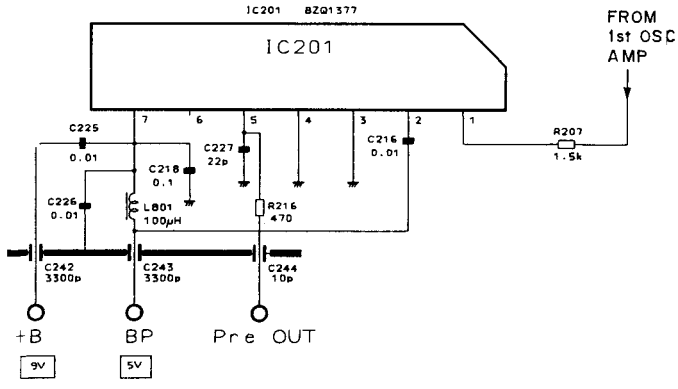


Fig. 6 Prescaler

7. 1st IF Filter and 1st IF Amplifier (Fig. 7)

The IF filter is inter–connected to both sides of the IF amplifier; the pre–stage and the rear stage sections are low loss filters with a coaxial resonator.

The IF amplifier compensates for signal losses in the filter sections.

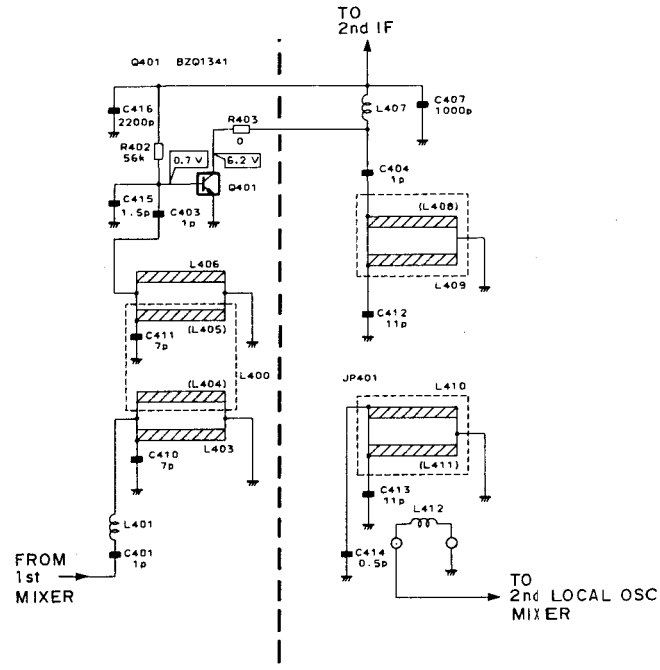


Fig. 7 1st IF Filter and 1st IF Amplifier

8. 2nd Local Oscillator and Mixer (Fig. 8)

The 2nd local oscillator keeps a constant oscillation frequency of 567MHz by using AFC voltage from the main assembly. The 567MHz output frequency is then routed to the 2nd mixer.
The 2nd mixer, using diode (D501), mixes signals from the 1st IF and the 2nd local oscillator, the resultant frequency is the 2nd IF frequency (Fv=45.75MHz, Fa=41.25MHz).

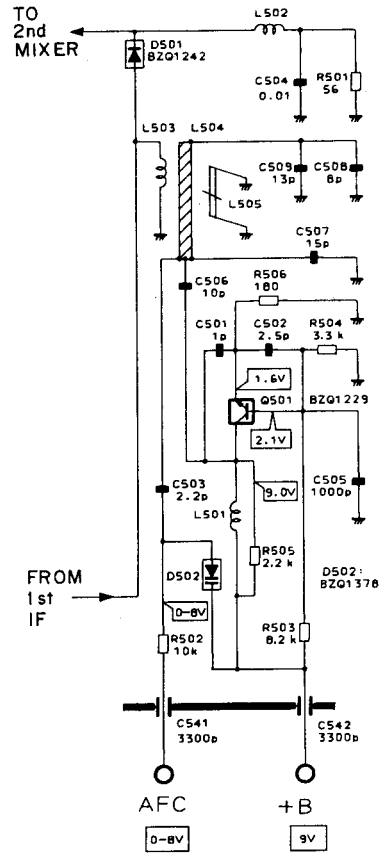


Fig. 8 2nd Local Oscillator and Mixer

9. 2nd IF (Fig. 9)

The 2nd IF filter response is such that it passes only the 2nd IF frequency and the IF amplifier provides the necessary output signal gain.

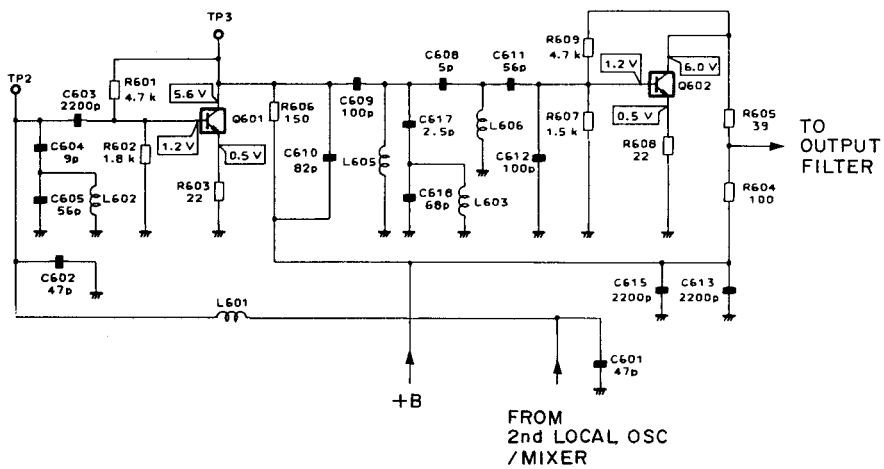


Fig. 9 2nd IF

7.2 MAIN ASSEMBLY (BWM1100)

1. FSK

1.1 Outline (Fig. 10)

The data signal that was converted into data carrier through FSK (Frequency Shift Keying) modulation is sent, together with the TV signal, from the CATV center to individual terminals by way of the CATV distribution system. This data signal is branched from the TV signal in the converter assembly and then supplied to the FSK input filter.

The purpose of the FSK receiver is to amplify, demodulate, and shape the original downstream signal. The data signal is then sent to the MPU IC402 for control purposes. The FSK receiver is made up of an input filter, pre-amplifier, mixer, frequency discriminator, and data shaper circuits.

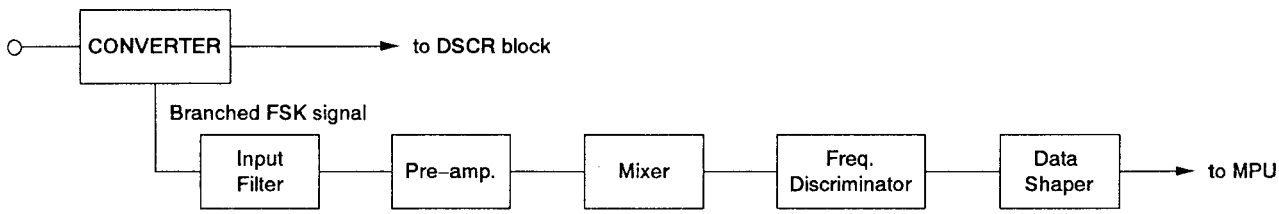


Fig. 10 FSK Block Diagram

1.2 Input Filter (Fig. 11)

The input filter is a band-pass filter which has an input/output impedance of 75Ω and a passes 110MHz. L1 and L2 are used for filter adjustments.

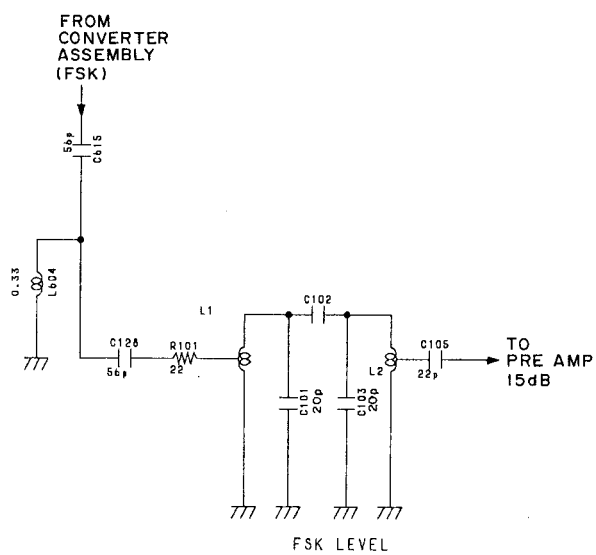


Fig. 11 Input Filter

1.3 Preamplifier (Fig. 12)

The pre-amplified amplifies the RF data carrier by approximately 15dB before sending the signal to the Mixer circuits.

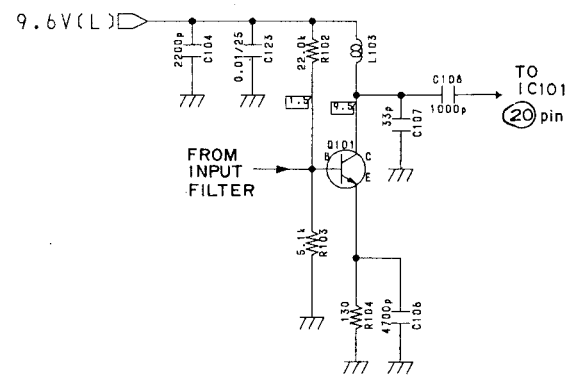


Fig. 12 Preamplifier

1.4 Mixer, Frequency Discriminator and Data Sharper (Fig. 13)

This circuit is mainly composed of IC101, X101 (SAW Resonator), F101 (IF Filter) and F102 (Ceramic Discriminator). The 110MHz data carrier is mixed with a lower, 99.3MHz, local oscillator frequency for conversion into the 10.7MHz IF signal.

A SAW Resonator is used for the local oscillator signal to ensure stable operation.

The IF signal is bandwidth limited at F101, routed through the Limiter Amplifier in IC101 and supplied to the Frequency Discriminator.

The Frequency Discriminator detects the IF signals in the Quadrature Detector which is comprised of F102 and IC101. Signals are then routed through the wave shaper circuit and finally sent to IC402 (MPU).

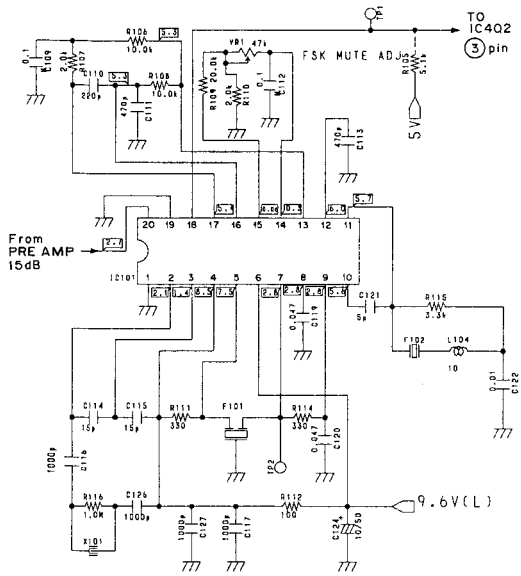


Fig. 13 Mixer, Frequency Discriminator and Data Shaper

2. Descrambler

2.1 Outline (Fig. 14)

The descrambler operates on the "Gated Sync Suppression" principle with a compression factor of 0dB, 6dB, or 10dB. The MPU IC402 utilizes the demodulated in-band signals for the control of descrambling operations. The descrambler is composed of the input amplifier, Fa filter, in-band detector, MPU, and expansion circuits.

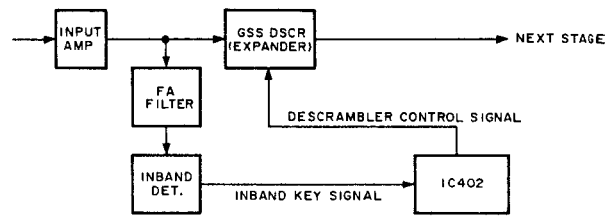


Fig. 14 Descrambler Block Diagram

2.2 Input Amp. (Fig. 15)

The input amplifier amplifies the entire input signal by approximately 25dB. After being amplified the signal is routed to the Fa filter and expander circuits.

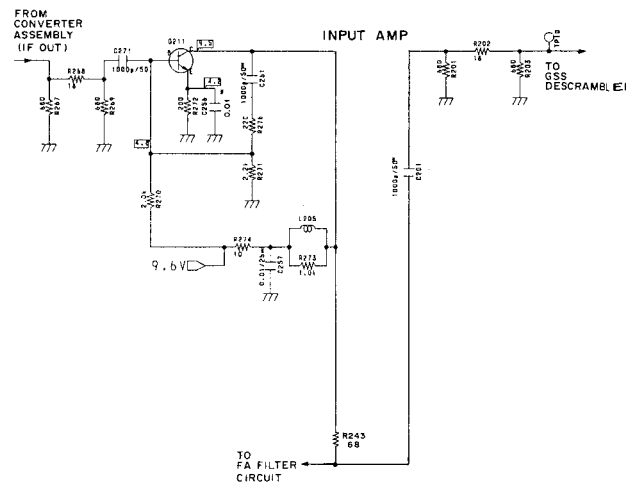


Fig. 15 Input Amp.

2.3 Fa Filter (Fig. 16)

The Fa filter is a band–pass filter which passes the audio carrier and removes the color sub–carrier and the video carrier of the upper adjacent channel.

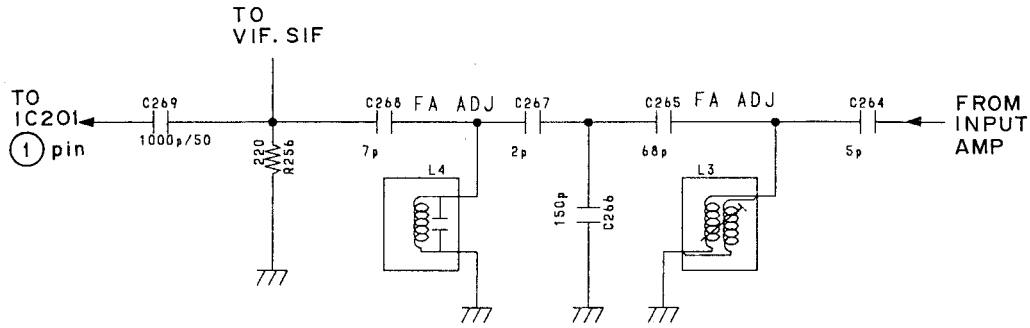


Fig. 16 Fa Filter Circuit

2.4 IN–BAND Detector (Fig. 17–19)

The in–band data is transmitted as amplitude modulation on the TV audio signal and is routed to IC201 for data detection. T4 is used for the detection frequency adjustment.

The detected in–band signal has its waveform reshaped by Q204 and Q205 and is then supplied to IC402.

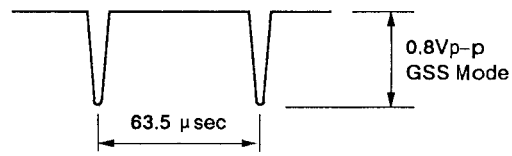


Fig. 17 Detected in–band Key Signal

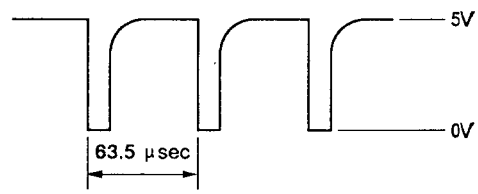


Fig. 18 Key Signal after Reshaping

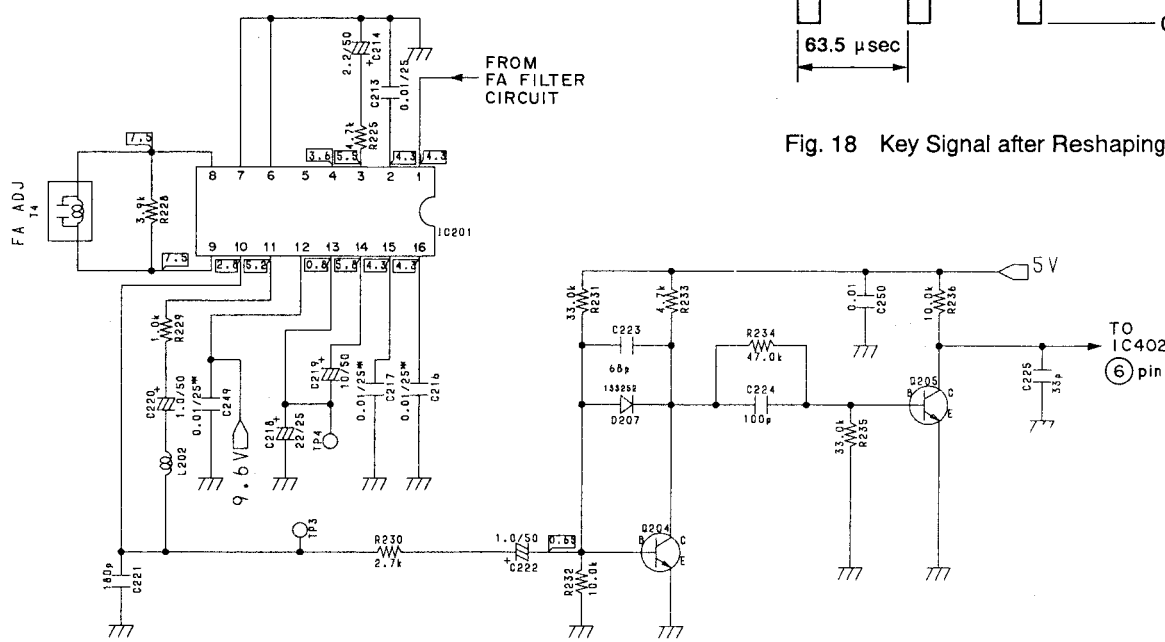


Fig. 19 In–band Detector

2.5 GSS Descrambler (Expander) (Fig. 20)

The GSS DSCR is operated by the DSCR control signal obtained from IC402. With "No–EXP" (both 6–EXP and 10–EXP control signals are "LOW" level), D203, D204 are turned on, and D201, D202 are turned off, causing an attenuation factor of 10dB. With "6–EXP", D202, D204 are turned on and D201, D203 are turned off, causing an attenuation factor of 4dB. With "10–EXP", D201 is turned on and the others are turned off, causing an attenuation factor of 0dB.

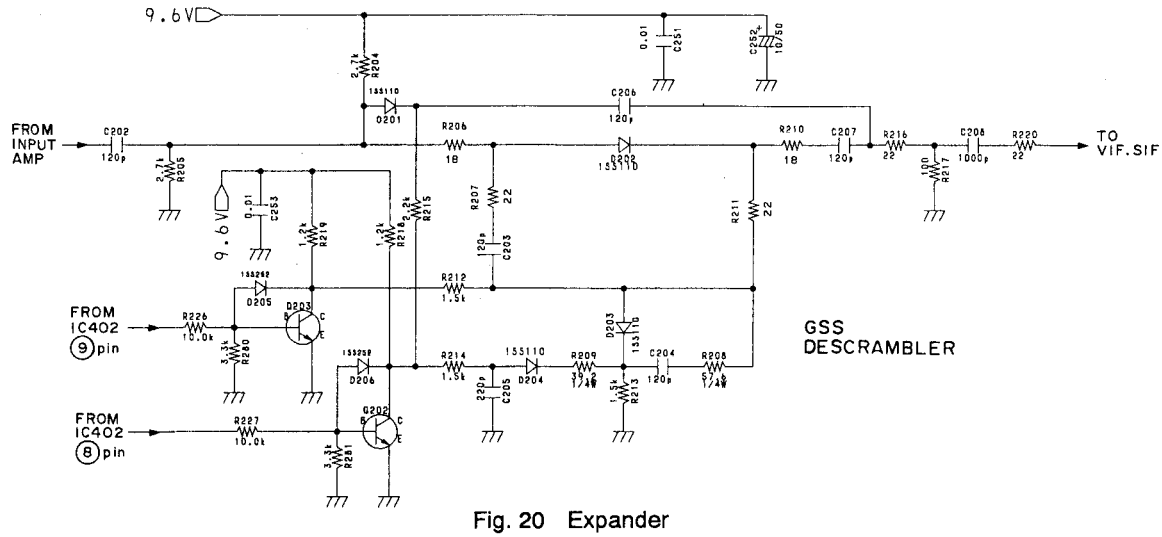


Fig. 20 Expander

3. PLL Control (Fig. 21 to 23)

IC402 receives remote control, keypad, parental control, and other pertinent data: then compares this new data with previously received and stored data in the internal RAM. Also, a frequency divided signal (Pre–out) Fig. 21 is sent from the Converter Assembly to IC402 pin 11. These signals are processed internally by IC402 and after comparison a signal (PD) is sent from IC402 pin 13 to the loop filter Fig. 22. The loop filter consisting of Q601, Q602 and associated circuitry generates a Tuning Voltage (Vt) which is sent to the Converter Assembly for controlling the 1st Local Oscillator Fig. 23.

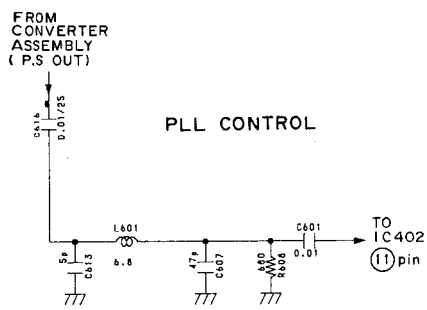


Fig. 21 Prescaler Filter

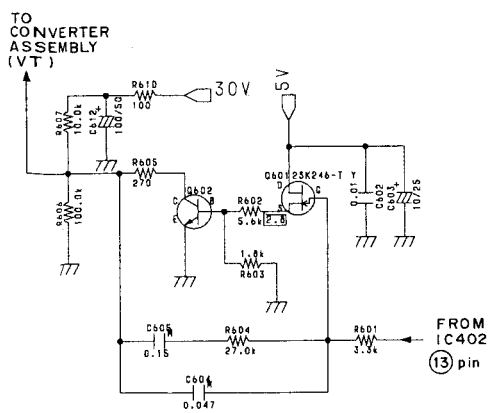


Fig. 22 Loop Filter

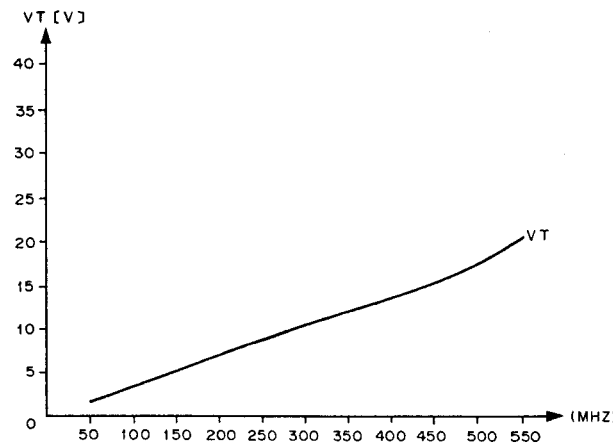


Fig. 23 VT–f Characteristic

4. Picture IF and Sound IF IC202 (Fig. 24, 25)

The video and audio IF signals sent from the Descrambler (DSCR) section are detected by IC202 and then sent to the RF modulator circuit.

After passing through the SAW filter F202 the video signal (45.75MHz) is sent to IC202 pins 10 and 11. The signal is then internally processed and sent to the RF modulator circuit from pin 28. L203, a ceramic trap, removes the audio component from the video signal. The functions of other attaching parts and related IC202 pins are as follows:

- The oscillator coil T1 for the Voltage Control Oscillator (VCO) is connected between pins 29 and 30. The VCO frequency is approximately 22.875MHz and can be measured at TP5.
- The Automatic Frequency Tuning (AFT) coil T2 is connected between pins 16 and 17. This coil allows for the adjustment of the converter assembly output frequency. The AFT voltage can be measured at pin 14 or TP7.
- A variable resistor (VR2), connected to pin 4, is used as an adjustment for the Automatic Gain Control (AGC) starting point. The AGC voltage can be measured at pin 5 or TP8.

After passing through the Fa filter circuit, the audio IF signal (41.25MHz) is sent to IC202 pin 8. The signal is converted internally to a 4.5MHz carrier and sent out from pin 27 through a ceramic filter F203 and back in at pin 25. The internally detected signal is sent from pin 21 through a LC filter to pin 20. The processed signal can be measured at TP6. The input audio signal sent out from pin 21 through a LC filter and back in at pin 20 is amplified and sent out on pin 19 to the RF modulator. The audio signal is controlled internally by the volume control voltage coming in from pin 18 and the mute voltage coming in from pin 22. The detection coil T3, for the sound IF, is connected between pins 23 and 24.

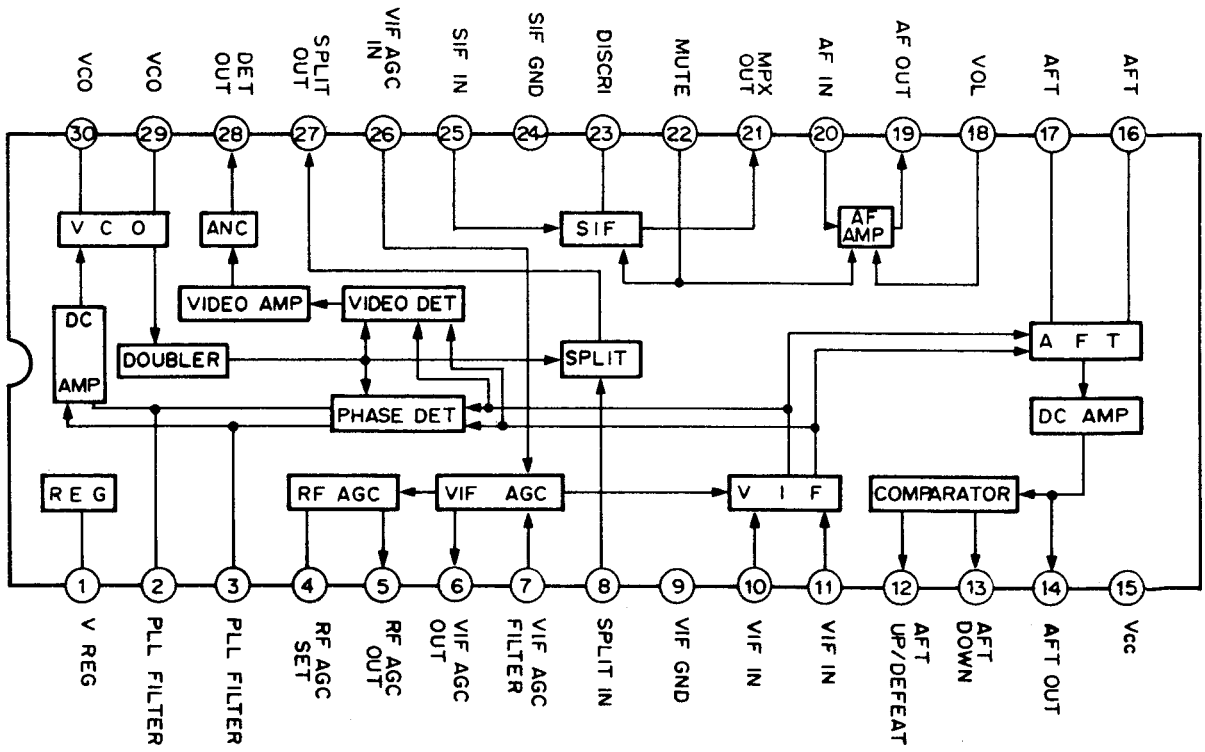


Fig. 24 IC202 (CXA1110BS) Terminal Connections

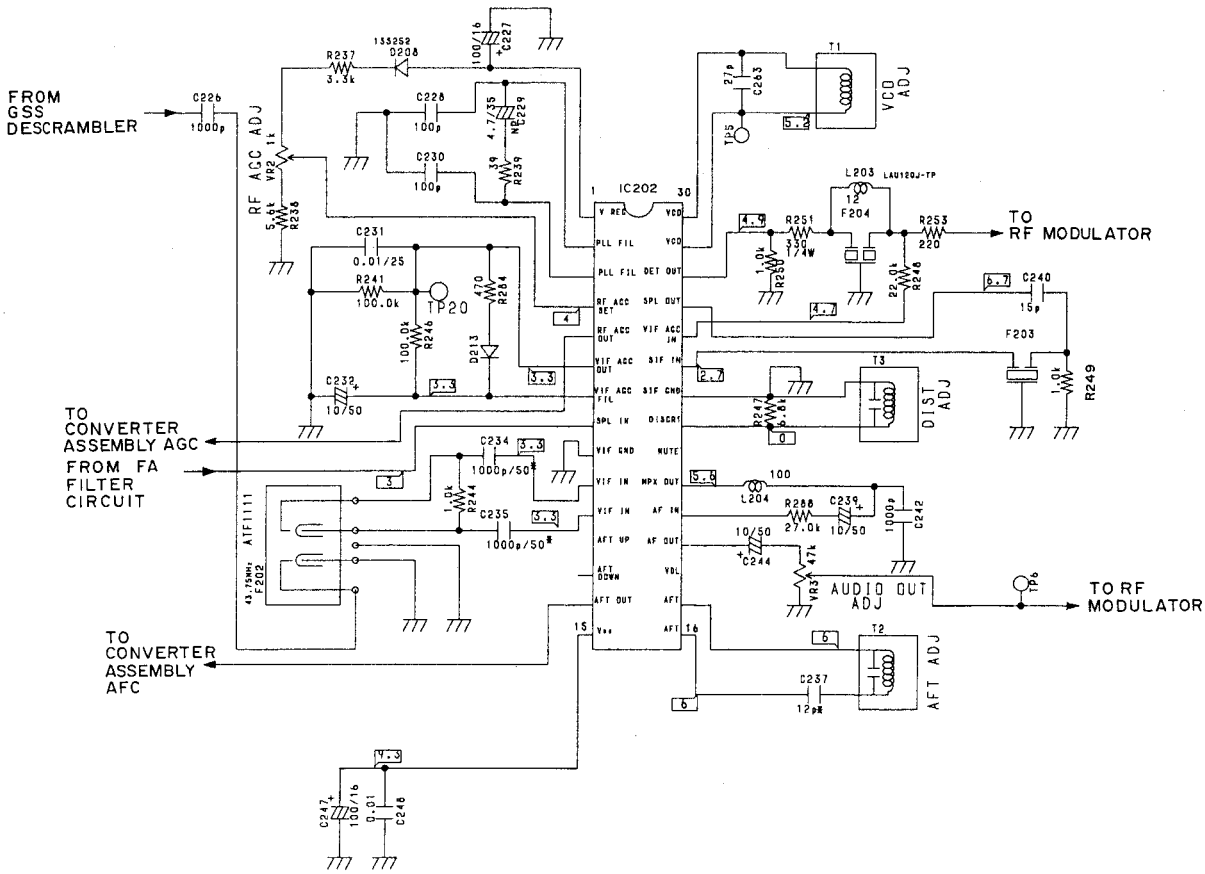


Fig. 25 PIF, SIF

5. RF Modulator (Fig. 26)

The RF modulator IC allows for wide-band video modulation utilizing white clip characteristics along with a high level signal output. Also, this IC features stable characteristics due to both power supply and temperature fluctuations.

Output channel selection is done by setting IC402 pin 62 to "H" for CH. 3 (61.25MHz) or "L" for CH. 2 (55.25MHz). This changes the frequency of the RF carrier oscillator.

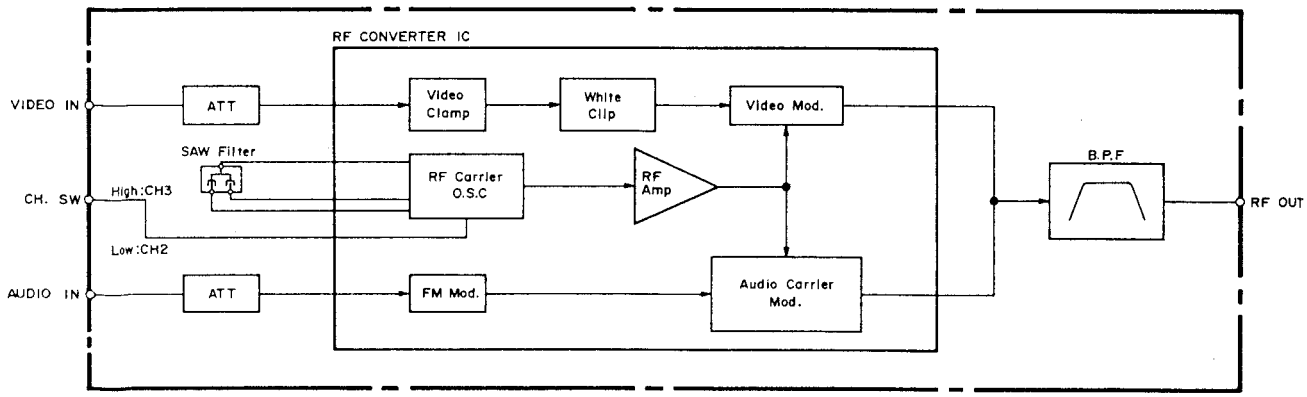


Fig. 26 RF Modulator Block Diagram

6. Power Supply Section (Fig. 27)

The power supply section is capable of providing DC power of +5, +5.6, +9, +9.6, +12 and +30 volts. The +5, +5.6 and +9.6 volt systems consist of fullwave bridge rectifier and IC regulator. The main characteristic of this type of circuit is the low input/output voltage difference and high stability. The +9 volt system uses the same fullwave rectified voltage provided to the +5 volt system. The +9 volt system is used to provide driving power to the D418 LED display and +12 volt is to relay RY801. Power for the +30 volt system is obtained by the transistor (Q301) and zener diode (D303) regulator circuit.

Note: +9 and +12 Volts are unregulated.

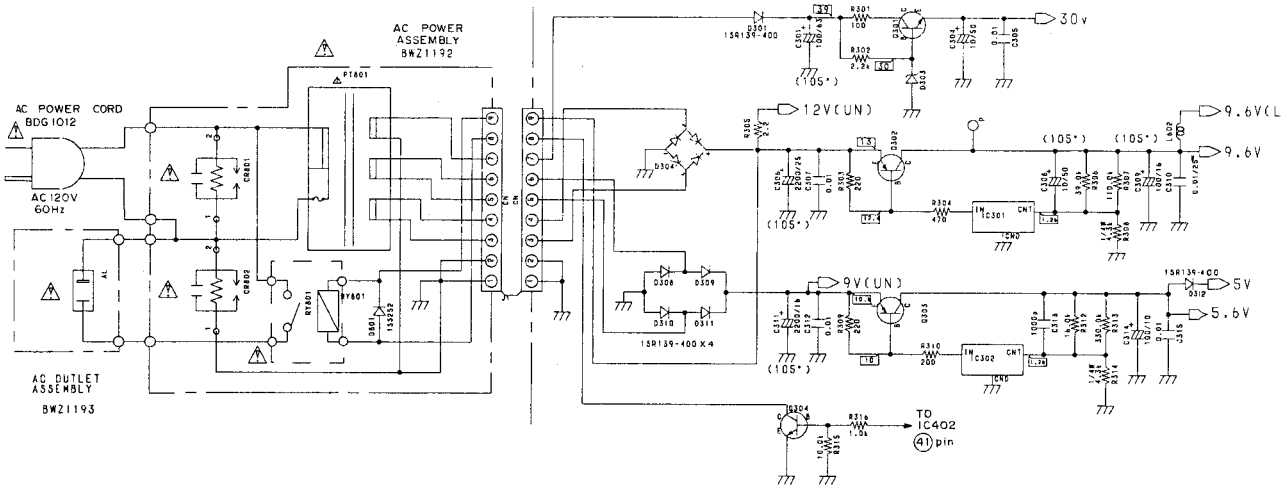


Fig. 27 Power Supply Section

7. Logic Section (Fig. 28)

The logic section is comprised of the MPU IC402, EAROM IC403 and reset circuit. Refer to the block diagram Fig. 28 of this section. Main features are listed.

- FSK data receiving
- Data entry from IR receiver
- Output to display LEDs
- AC outlet control
- PLL control
- Volume control
- Parental control
- Resetting

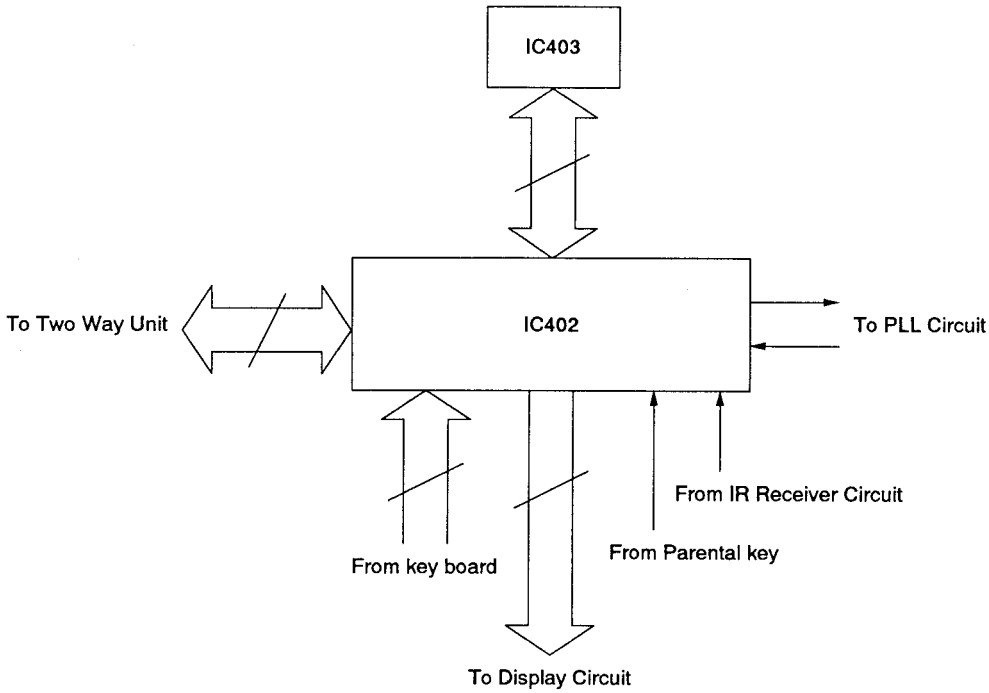


Fig. 28 Block Diagram of Logic Section

7.1 FSK Data Reception

FSK data is supplied from the FSK circuit to pin 3 of IC402 as a BPS signal format.

The MPU (IC402) receives commands when decoding the BPS signal internally.

7.2 Data Entry from IR Receiver (Fig. 29)

In the receiver, the code (PCM code with a 42kHz carrier wave) transmitted over infrared rays is converted to an electrical signal by the photodiode. The signal is then amplified, detected and the output waveform reshaped before it is sent to IC402. IC402 receives this output waveform through pin 40 for internal command processing.

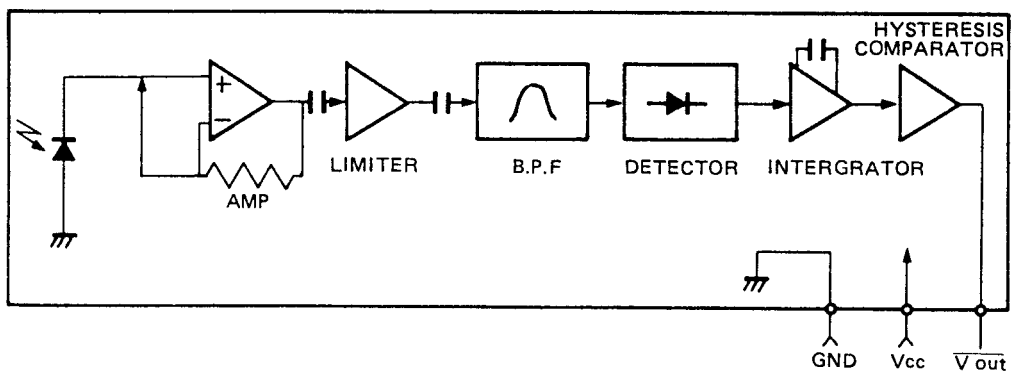


Fig. 29 IR Receiver Unit Block Diagram

7.3 Output to Display LEDs (Fig. 30)

Selected channel and timer data displayed on D418 (BEL1008) are controlled by Q409–416 via resistors R434–441.

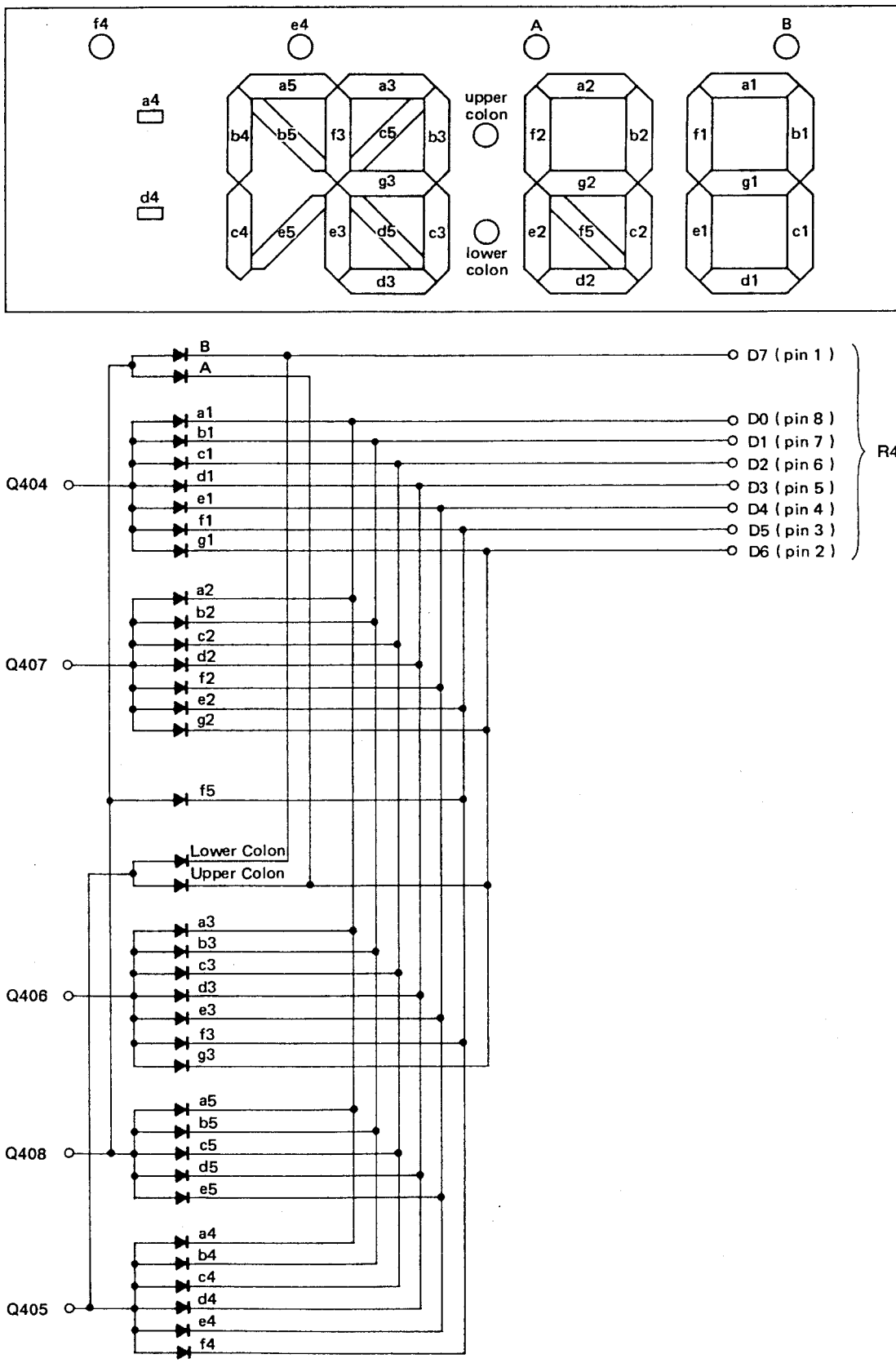


Fig. 30 Display Portion

7.4 Parental Control

When the parental control channel lock lever is in the locked position, the pin 42 of IC402 goes "low". At this point, if a parental controlled channel is selected and the "PC function enable" is established with a center command, then IC402 causes the PC LED "A" (See Fig. 30.), to blink and the disable channel to be tuned in. Table 1 shows the parental control channel lock key logic.

Logic	Pin 42
LOCK	L
UNLOCK	H

Table 1 Parental Control Channel Lock Key Logic

7.5 AC Outlet Relay Control

When the keypad ON/OFF key is pressed to the ON condition, data is sent to IC402 for processing and then a signal from pin 41 of IC402 is sent to Q304 which energizes RY801 supplying AC power to the outlet.

AC Outlet	Pin 41
ON	H
OFF	L

Table 2 AC Outlet Relay Control Logic

7.6 Output Channel (CH. 2/CH. 3) Control

Selection of the output CH. 2/3 to the TV set is performed by the RF modulator. Control of the output channel is performed by the MPU IC402 pin 62.

Output Channel	Pin 62
Channel 2	L
Channel 3	H

Table 3 Output Channel (CH. 2/CH. 3) Control

7.7 Muting Control

IC402 pin 63 output is used to control the audio mute circuits and is normally held at a "HIGH" level. During a mute condition pin 63 outputs a "LOW" level.

7.8 Volume Control

When the volume control is set to enable, volume control is possible using the "VOL +" and "VOL –" keys. The variable range for volume shown on the display is V0 to V63.

When the volume control is set to disable, the volume remains constant at a level of V50. The volume level goes to V0 when muting is applied by the MUTE key.

7.9 Resetting (Fig. 31)

When AC power is applied to the CATV Converter the RESET terminal of the MPU IC402 pin 28 outputs a "HIGH" level and allows the turn on of the 8MHz oscillator. When the AC power is removed (un-plugged) the 12VDC power supply source begins to drop sooner than the 5VDC power source. This drop in the 12VDC voltage is detected by the Low Voltage Detection circuit consisting of D401, Q401, and Q402. When the 12VDC voltage drops to near 8 volts, stopping the Zener action of D401, Q401 goes to the cut-off condition, Q402 goes into conduction providing a "LOW" to the MPU IC402 pin 26 (INT1). Consequently an interrupt condition occurs causing the MPU to read the input data and change to the Standby Mode just prior to complete AC power loss. While in the Standby Mode the MPU maintains the storage of internal data because of the 3VDC lithium battery voltage applied to IC402.

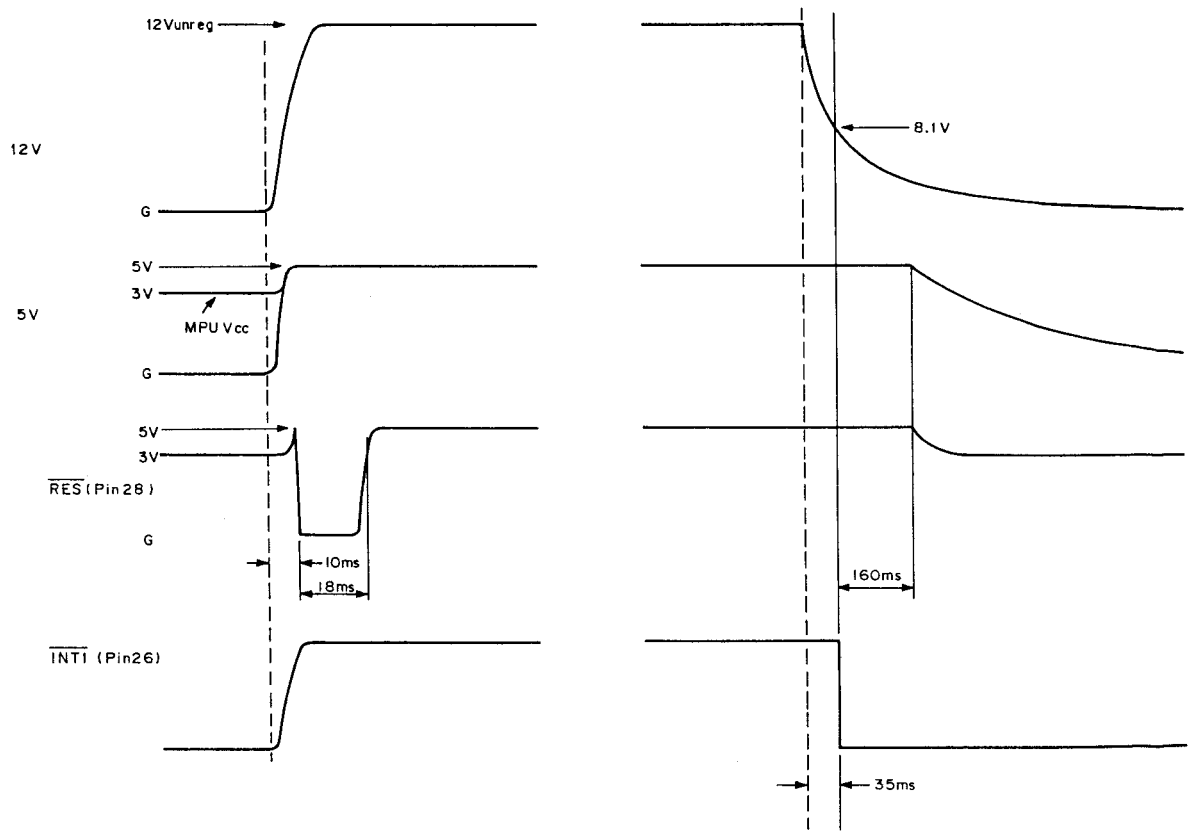


Fig. 31 Resetting Timing Chart

7.3 CABLE RETURN ASSEMBLY (BWX1034) BA-6310C ONLY

1. Outline (Fig. 32)

The cable return assembly is internally connected to the main assembly and the converter assembly. The power supply, PLL control signal, transmission data, etc. are input from the main assembly and the RF upstream signal FSK-modulated by the transmission data is output to the converter assembly.

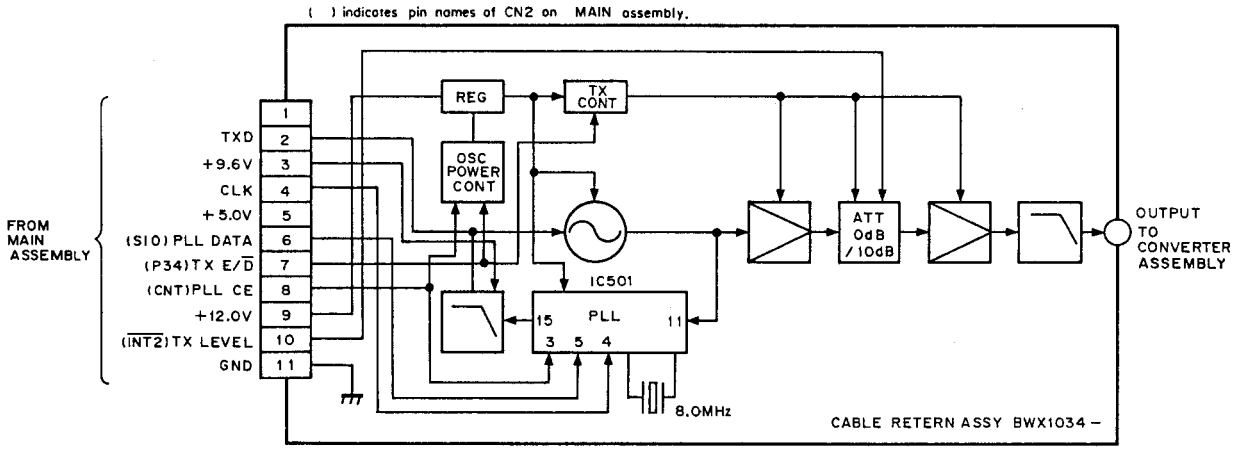


Fig. 32 Block Diagram

2. PLL and RF Modulation (Fig. 33, 34)

The MPU IC402 on the main assembly sends the PLL data, PLL CE, and CLK information to the Phase Lock Loop frequency synthesizer IC501. This data, after processing and control the RF signal is sent through the Output Control circuits and the Converter Assembly to the cable system. The PLL circuit has the ability to change the output frequency range between 20.5MHz through 26.0MHz excluding 21MHz and 22.0MHz. These changes can be acccomplished in 500kHz steps. The tuning voltage from the PLL is used to control a Voltage Controlled Oscillator (VCO) Q510/511 which is modulated by the TXD through D503.

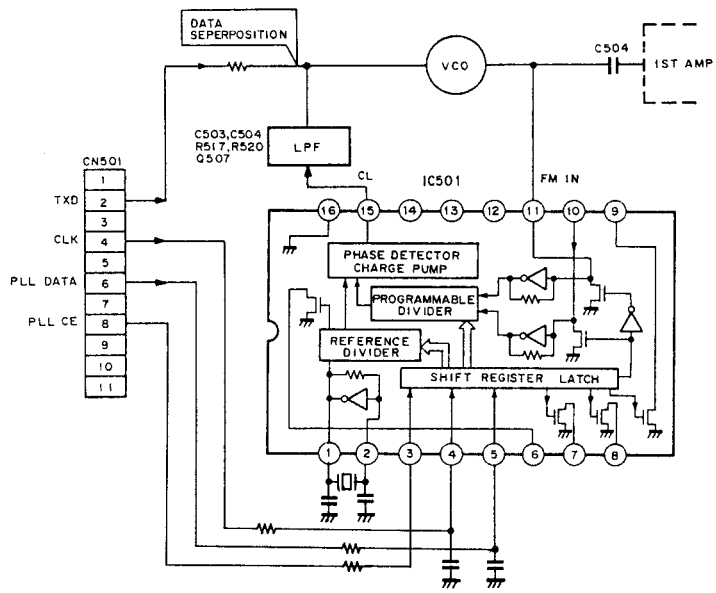


Fig. 33 PLL and RF Modulation

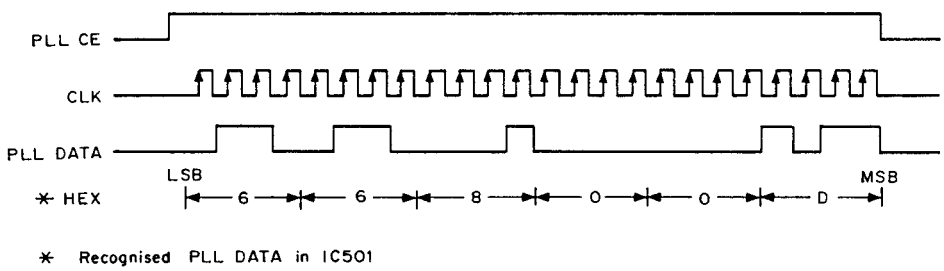


Fig. 34 PLL DATA Timing Chart

3. Output Level Control (Fig. 35)

This section is composed of two amplifiers, an attenuator and a power ON/OFF circuit. The Output Level Control circuit is used to control the different levels of the upstream RF signal. When the TX E/$\overline{D}$ signal is at a "LOW" level the output of the RF signal is put into a standby (no output) status. The effects of the output attenuator level are as shown in Table 4.

① High transmission level (enable 50dBmV)
② Low transmission level (enable 40dBmV)
③ Standby level (disable output)

OUTPUT LEVEL	Tx. E/$\overline{D}$	Level	AMP 1	AMP 2	D504	D505	ATT
①	High	Low	ON	ON	ON	OFF	0dB
②	High	High	ON	ON	OFF	ON	10dB
③	Low	High	OFF	OFF	OFF	ON	10dB

Table 4

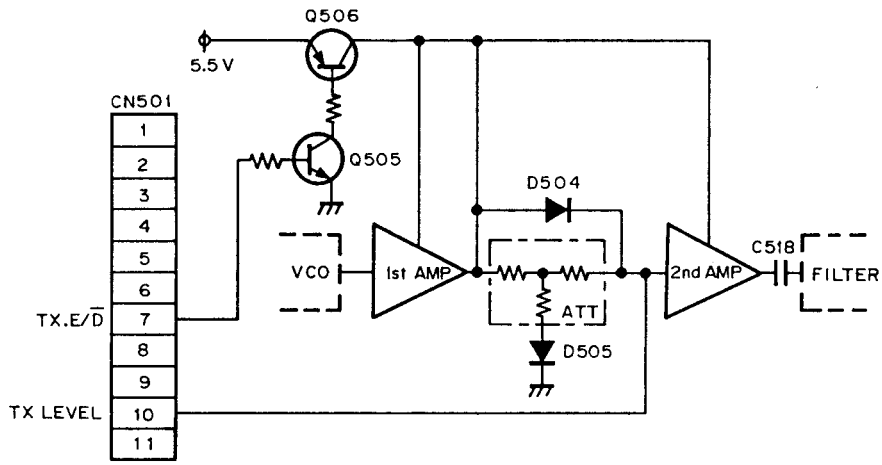


Fig. 35 Output Level Control

4. Filters for Output Signal (Fig. 36)

These filters serve to eliminate the high frequency components in the RF output signal of Q508 and to reduce interference to the input TV signal. Moreover, L506 functions as a lightning arrester by providing a low impedance path to ground for lightning discharges that may strike the cable system.

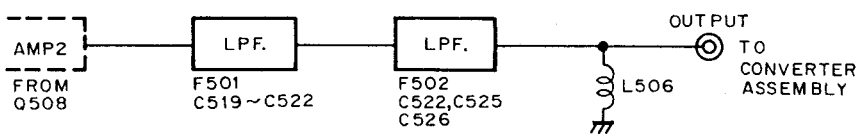


Fig. 36 Filters for Output Signal

5. Regulator and OSC Power Control (Fig. 37)

The regulator section, Q503 and associated circuitry, controls the non–regulated +12VDC sent from the Main Assembly to the Cable Return Assembly. The non–regulated +12VDC is regulated to +5.5VDC by the regulator circuit. The OSC power control circuits, Q501/502, control the output of the +5.5VDC regulator circuit. When the TX E/$\overline{D}$ and CE input data are both "HIGH", the base voltage of Q503 control transistor becomes 0VDC. This prevents Q503 from providing the +5.5VDC source to the PLL, VCO, and Output circuits effectively shutting down the Cable Return Assembly.

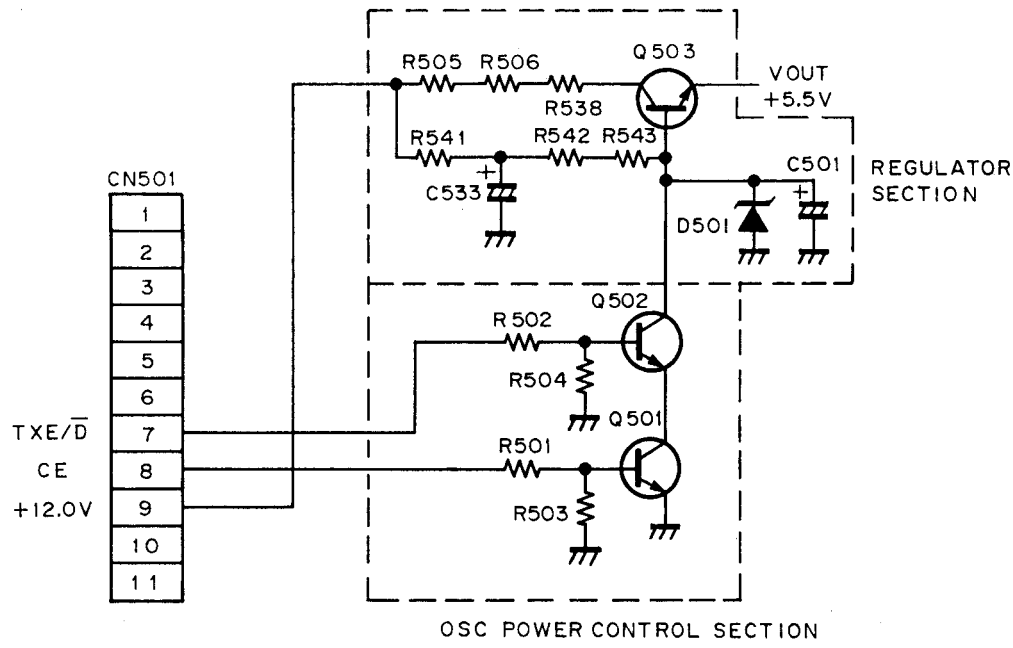


Fig. 37 Regulator and OSC Power Control

8. TROUBLESHOOTING

8.1 FIRST CHECK FOR POSSIBLE MISOPERATION

1. Terminal connections and installation checks

(1) Is the AC power on?
(2) Are the input and output connectors properly connected?

2. TV set operational checks

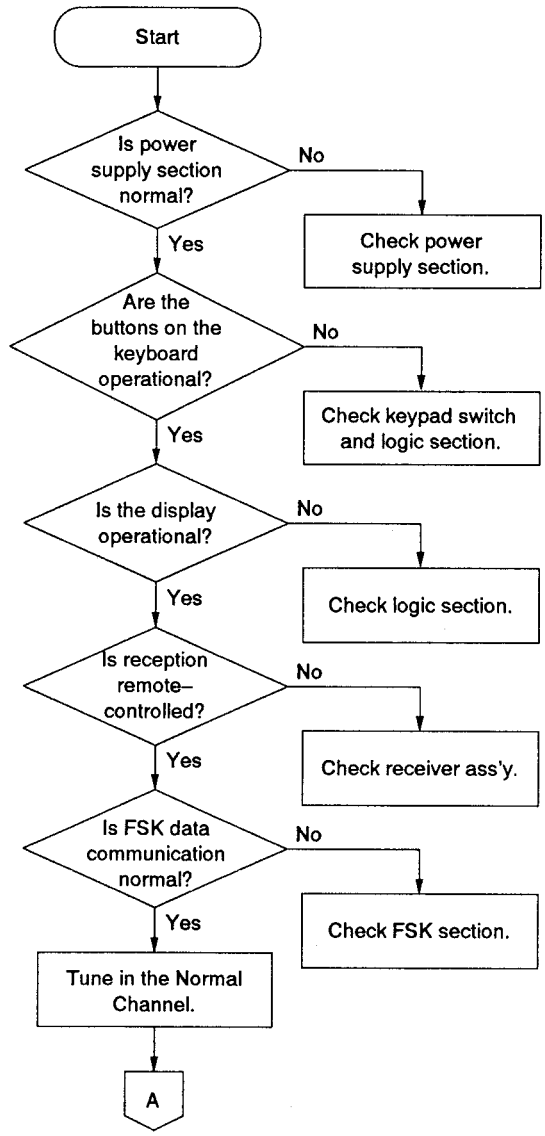
(1) Has channel 3 or 2 been selected?
(2) Is the POWER switch on?
(3) Has the tuning been correctly set?

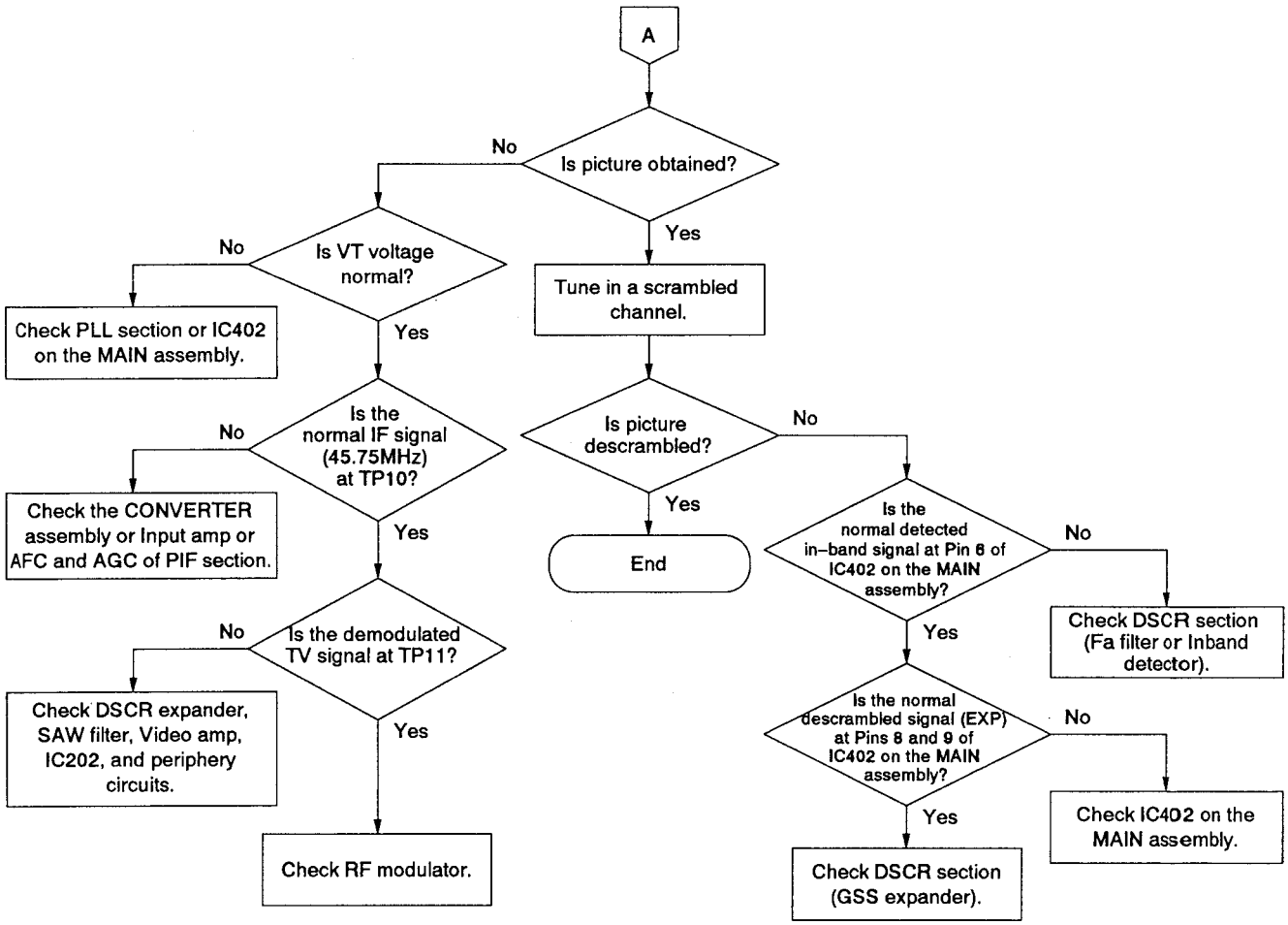
8.2. TROUBLESHOOTING GUIDELINES

1. Troubleshooting guidelines

When carrying out troubleshooting, TV and FSK signals must be used at the appropriate levels. HRC/Standard signals, frequency allocation, scramble mode, terminal address, Channel data, etc. should also be set at their proper levels. The remote consoles to be used should be free from defects.

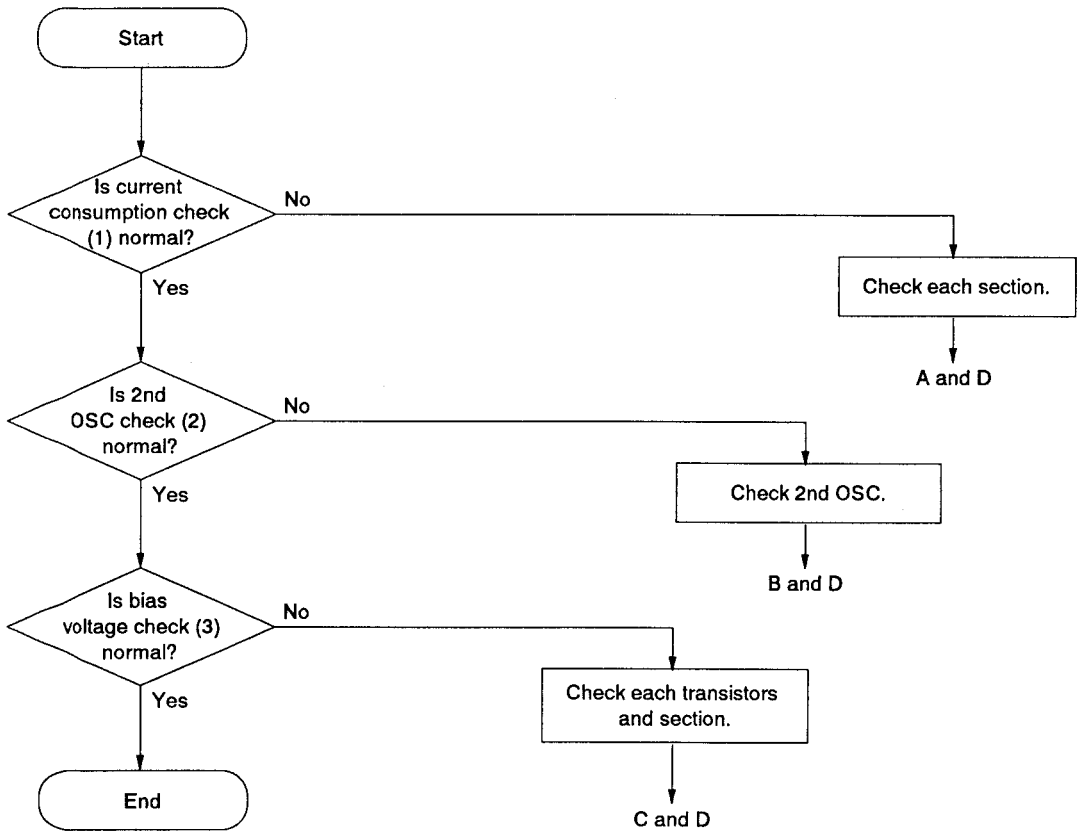
2. Check step




A
Is picture obtained?
No
Yes
Is VT voltage normal?
No
Yes
Check PLL section or IC402 on the MAIN assembly.
Tune in a scrambled channel.
Is the normal IF signal (45.75MHz) at TP10?
No
Yes
Check the CONVERTER assembly or Input amp or AFC and AGC of PIF section.
Is picture descrambled?
No
Yes
End
Is the demodulated TV signal at TP11?
No
Yes
Check DSCR expander, SAW filter, Video amp, IC202, and periphery circuits.
Check RF modulator.
Is the normal detected in-band signal at Pin 6 of IC402 on the MAIN assembly?
No
Yes
Check DSCR section (Fa filter or Inband detector).
Is the normal descrambled signal (EXP) at Pins 8 and 9 of IC402 on the MAIN assembly?
No
Yes
Check IC402 on the MAIN assembly.
Check DSCR section (GSS expander).

8.3 CONVERTER ASSEMBLY (BWE1030)

Converter malfunction check steps.



(1) Current Consumption Check

Terminal Name of Converter	Amperage
VT (0 to 28V)	10 μA max.
+B (9V)	150mA max.
+BP (5V)	40mA max.
AGC (0 to 7V)	100 μA max.
AFC (0 to 8V)	10 μA max.

(2) 2nd local OSC check
Check the oscillation frequency of the 2nd local OSC. It is normal if within 567MHz ± 50kHz.

(3) Bias voltage check
See SCHEMATIC DIAGRAM for BWE1030.

A: Defective current

Terminal Name of Converter	Remedy
VT (0 to 28V)	Check D201 and 1st local OSC section, or D101 and D102, and input filter/AGC amp sections.
+B (9V)	Check Q201 to Q203 and 1st local OSC/OSC amp sections, or Q401, Q501, Q601, Q602 and 1st IF/2nd OSC/2nd mixer/2nd IF sections.
+BP (5V)	Check IC201.
AGC (0 to 7V)	Check Q101 and AGC amp section.
AFC (0 to 8V)	Check Q501, D502 and 2nd local OSC section.

B: Malfunction in 2nd OSC

Remedy
Readjust by L505 or check Q501.

C: Defective voltage

Transistor	Remedy
Q101, Q102	Check Q101, Q102 and AGC amp section.
Q201 to Q203	Check Q201 to Q203 and 1st local OSC/OSC amp sections.
Q401	Check Q401 and 1st IF section.
Q501	Check Q501 and 2nd local OSC section.
Q601, Q602	Check Q601, Q602 and 2nd IF section.

D: Defective symptoms

Problem	Cause	Check
1st OSC does not lock.	Defect in 1st oscillator.	Check Q201 and D201.
	Defect in oscillator amplifier.	Check Q202 and Q203.
	Defect in Prescaler.	Check IC201.
Beat, modulation	Defect in 1st mixer.	Check D301 and D302.
	Reduce gain at 1st oscillator.	Check TP1 level (normal: 1 to 3VDC). Check Q202 and Q203.
Picture is blurred.	Defect in 2nd oscillator.	Check the oscillation frequency. Check Q501 and D502.
No picture.	Defect in 1st oscillator.	Check the oscillation frequency.
	Defect in 2nd oscillator.	Check the oscillation frequency.
	Defective output waveform.	Check 1st and 2nd IF output waveform.

8.4 MAIN ASSEMBLY (BWM1100)

1. Main Assembly Logic Section

When checking the logic section for defects and repairing it, the "H" and "L" levels used in the below description refer to voltage of 2V or more and 0.8V or less respectively, assuming that the power, FSK and DSCR sections are normal. When checking, ACT plate (BNG1054) must be grounded.

Symptoms	Checking Procedure	Remedies
(1) Operational failure of main assembly	Is 5V ± 10% voltage applied at pin 1 (Vcc) of IC402? Is the oscillator signal available at pins 29 (XI) and 30 (XO) of IC402? Is pin 28 ($\overline{\text{RESET}}$) of IC402 at "H"?	No: Confirm power supply section. No: Replace IC402 or X401. No: Confirm reset section.
(2) Keys other than ON/OFF key are not operational.	Is "E5" displayed on D418? Is "E4" displayed on D418? Is "E2" displayed on D418? Is "E1" displayed on D418? Is "E3" displayed on D418? Is any information displayed on D418? Refer to "Display is not operational."	Yes: Carry out polling for the command to release CRP. Yes: Carry out polling for the command to release FF. Yes: Carry out polling for the command to release ACT. Yes: Replace IC403 and initial polling again. Yes: Carry out polling for normal command. Yes: Replace IC402.
(3) TV Power ON/OFF cannot be controlled.	Is a signal of 1.0V or more/0.4V or less available pin 41 of IC402 according to change in the ON/OFF key status?	No: Replace IC402. Yes: Replace Q304, power relay (RY801) and D801.
(4) Channel Lock switch cannot be controlled.	Is a "H" or "L" signal available at pin 42 of IC402 according to change Lock switch status?	Yes: Replace IC402. No: Confirm channel lock switch connection.
(5) Center command is not controllable.	Is control possible in the unique address mode?	Yes: Replace IC403. No: Replace IC402.
(6) Picture cannot be properly descrambled.	Is the normal signal available at pins 6 to 8, 9 and IC402?	No: Replace IC402.
(7) ACT cannot be released.	Is a "H" or "L" signal available at ACT (pin 2) of IC402 according to switching Short/Open circuit of ACT plate (BNG1054)?	Yes: Replace IC402.
(8) Display is not operational.	Does signal appear properly at pins 44 to 56 of IC402?	No: Replace IC402. Yes: Replace Q404 to Q416 and D418.
(9) Remote control key is not operational.	Does signal appear properly at pin 40 (Remote in) of IC402?	Yes: Replace IC402. No: Replace AXX1023 IR receiver.

2. Main Assembly PLL Section

Symptoms	Checking Procedure	Remedies
(1) No picture.	Is a normal prescaler signal (sign wave from approx. 4.5MHz to 9MHz) at Pin 11 of IC402 on the MAIN assembly coming from the CONVERTER assembly ?	Yes: Check the VT voltage of PLL section. No: Check the CONVERTER assembly and the prescaler filter.
(2) The channel can not be changed.	Does the VT voltage supplied to the CONVERTER assembly change according to channel selection?	Yes: The PLL section is normal. No: Check the CONVERTER assembly.
(3) Poor picture quality.	Does the picture have beats? Is the frequency of IF carrier stable at TP10?	Yes: Check the CONVERTER assembly or AGC of the PIF section. No: Check Q601, Q602 and the CONVERTER assembly. Yes: Check the DSCR section, the PIF section and the CONVERTER assembly.

3. Main Assembly FSK Section

Symptoms	Checking Procedure	Remedies
(1) The FSK command can not be received.	Is the command sent in the proper procedure? Is the 10.7MHz IF signal at TP2? Is the U-curve adjusted properly? Is the muting level adjusted properly?	No: Send the command in the proper procedure. No: Readjust L101 and 102 or replace IC101, X101 and F101. No: Readjust. Yes: Replace F102. No: Readjust.

4. Main Assembly Descrambler Section

Symptoms	Checking Procedure	Remedies
(1) No picture.	Is the normal IF signal (frequency and level) at TP10?	No: Check the CONVERTER assembly, Q211 or PIF/SIF section. Yes: Check Q201. Or check PIF/SIF section.
(2) Poor picture quality.	Is the picture quality of the normal channel also poor?	Yes: Check Q211, Q201 , D201 to D206 and PIF/SIF section. No: Check D201 to D206, Q202 and Q203. Readjust the Fa filter.
(3) Is not descrambled.	Is the normal inband signal detected at Pin 6 of IC402 on the MAIN assembly? Is the EXP signal output from Pins 8 and 9 of IC402 on the MAIN assembly. Is the Fa filter adjusted properly?	No: Check Q211, IC201, Q204 and Q205. No: Replace IC402. Yes: Check D201 to D206, Q202 and Q203. No: Readjust the Fa filter.

5. Main Assembly PIF/SIF Section

Symptoms	Checking Procedure	Remedies
(1) No picture.	Is the normal AGC voltage at TP8?	No: Replace IC202 when the CONVERTER assembly, Q201 and Q211 are normal.
	Is the normal AFC voltage at TP7?	No: Replace IC202 when the CONVERTER assembly, Q201 and Q211 are normal.
	Is the normal IF signal frequency at TP10?	No: Readjust VCO and AFT.
	Is the video signal at TP11?	No: Replace IC202. Yes: Replace the RF modulator.
(2) Poor picture quality. (Poor S/N) (Color deviation)	Is the normal AGC voltage coming to TP8?	No: Replace IC202 when the CONVERTER assembly, Q201 and Q211 are normal.
	Is VCO adjusted properly?	No: Readjust VCO.

6. Main Assembly IR Receiver Section

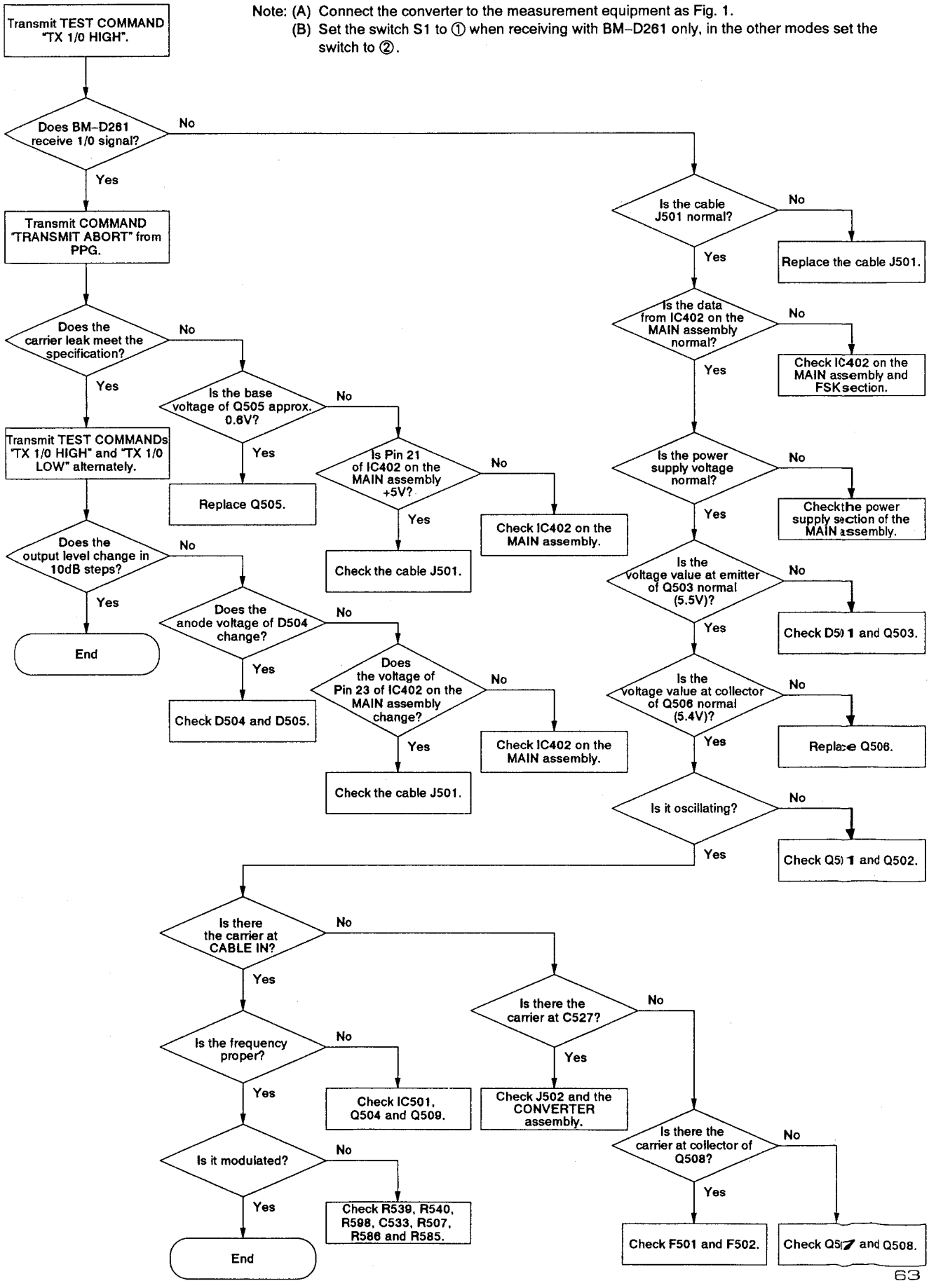
Symptoms	Checking Procedure	Remedies
(1) Unable to control using Remote	Is the signal at Pin 1 of the IR receiver?	No: Check jumper wire and replace AXX1023 when the wire is normal.
	Is the signal at Pin 40 of IC402 on the MAIN assembly?	No: Check jumper wire. Yes: Replace IC402.

7. Main Assembly Power Supply Section

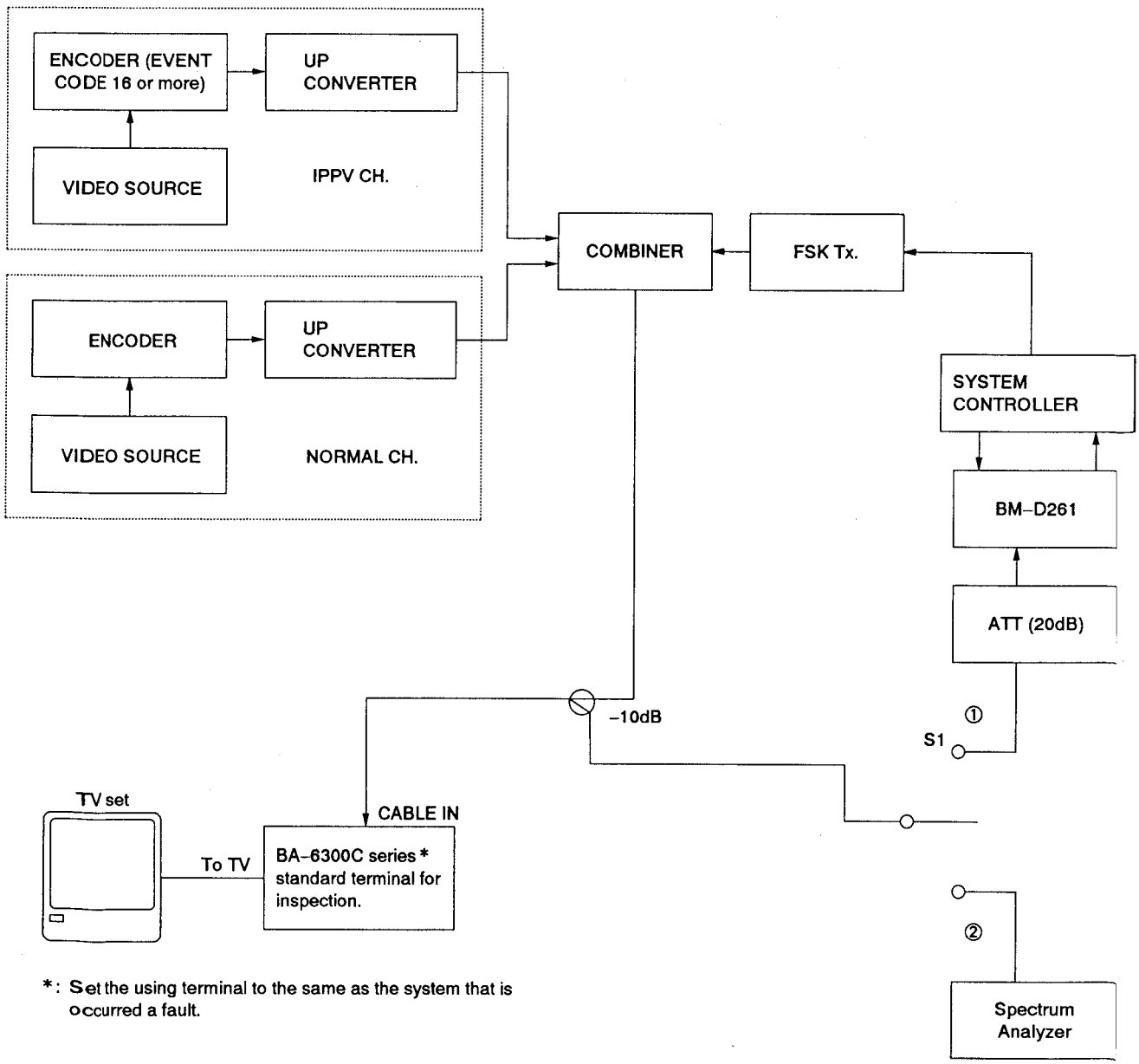
Symptoms	Checking Procedure	Remedies
(1) 9.6V is not output.	Is AC supplied from the transformer?	No: Replace the transformer T801.
	Is the approx. 12V voltage at Q302 emitter section?	No: Replace D304. Yes: Replace Q302 or IC301.
	Except the items mentioned above.	Check the choke coil L602.
(2) 5V is not output.	Is AC supplied from the transformer?	No: Replace the transformer T801.
	Is the approx. 9V voltage at Q303 emitter?	No: Replace D308 to D311. Yes: Replace Q303 or IC302.
	Except the items mentioned above.	Check the diodes D312 and D405.
(3) 30V is not output.	Is approx. 39V voltage at D301 cathode?	No: Replace D301 or the transformer T801. Yes: Replace Q301 and D303.

8.5 CABLE RETURN ASSEMBLY (BWX1034) BA-6310C ONLY

Note: (A) Connect the converter to the measurement equipment as Fig. 1.
(B) Set the switch S1 to ① when receiving with BM-D261 only, in the other modes set the switch to ②.



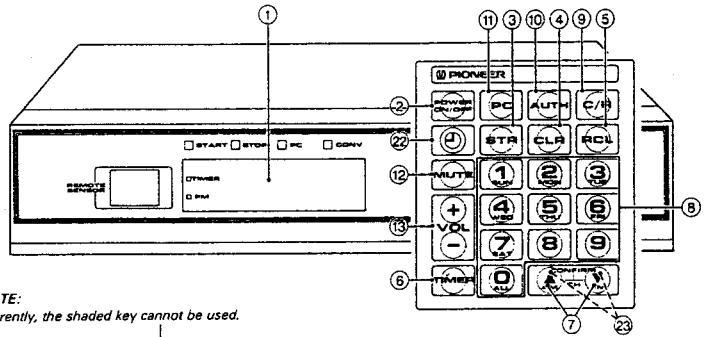
Symptoms	Checking Procedure	Remedies
(1) The output level does not change.	Does the anode voltage of D504 change?	No: Check IC402 and J501. Yes: Check D504 and D505.
(2) Can not communicate with BM-D261 FSK receiver?	Is an output present? Is the Tx frequency of the carrier matched to the receiver? Is the signal modulated? Does the VCO oscillate? Is +5.5VDC present at the emitter of Q503?	No: Check the CONVERTER assembly, J502, F501, F502, Q506, Q507 and Q508. No: Check IC501, Q504 and Q509. No: Check IC402. No: Check Q510 and Q511. No: Check Q503 and D501.
(3) The carrier leak is large.	Is the voltage at base of Q505 approx. 0.6V?	Yes: Replace Q505. No: Check IC402.



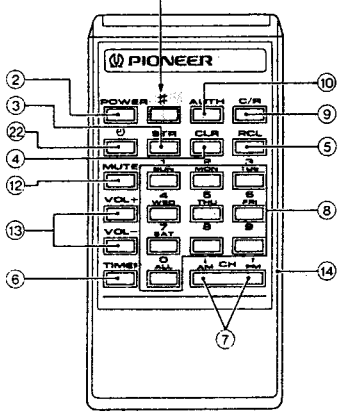
*: Set the using terminal to the same as the system that is occurred a fault.

Fig. 1 Connection Diagram

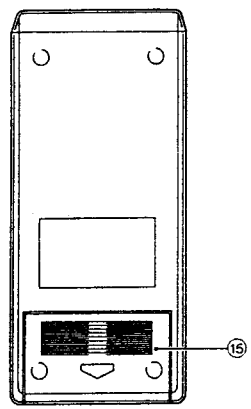
WARNING:
- *The keypad is delicate. Do not press it with sharp metal objects or similar items.*
- *Tampering with the converter or trying to force open the cover will cause the converter to stop functioning automatically.*



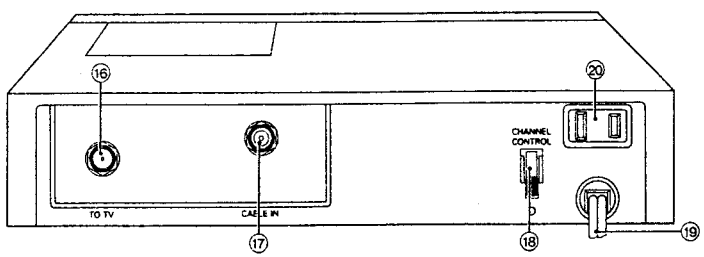
NOTE:
Currently, the shaded key cannot be used.



REMOTE CONTROL UNIT FRONT



REMOTE CONTROL UNIT BACK



NOTE:
UL caution label is located on the bottom of the converter.

① **DISPLAY**
Shows the channel number, time, confirmed pay-per-view event codes, volume level, etc.

② **POWER ON/OFF BUTTON**
Used to turn the power of the rear panel AC outlet on and off.

③ **STR (STORE)**
Stores selected channels in Favorite Channel Memory, and day, time and channel information for the TIMER function.

④ **CLR (CLEAR)**
Erases channels from Favorite Channel Memory, and erases data from the TIMER function.

⑤ **RCL (RECALL)**
Tunes in channels previously stored in Favorite Channel Memory, and recalls data from the TIMER function.

⑥ **TIMER**
Programs the converter to turn on and shut off at pre-designated times. (See the section on "HOW TO USE THE VCR TIMER", page 10.)

⑦ **CHANNEL UP/DOWN BUTTONS (▲ / ▼)**
Changes the channel either by stepping up one channel at a time (▲), stepping down one channel at a time (▼), or by "speed scanning" for quick channel access.

⑧ **TEN-DIGIT KEYPAD**
Used for direct channel selection and TIMER function data entry.

⑨ **C/R (CHANNEL/RESPONSE)**
— Two-way option only
Permits responses to an opinion poll or some other multiple-choice question to be entered.

⑩ **AUTH (AUTHORIZE)**
— Two-way option only
Allows the purchase and viewing of impulse pay-per-view events.

⑪ **PC (PARENTAL CONTROL)**
Programs and cancels the Parental Control Function (See Parental Control section, page 8, for details).

⑫ **MUTE**
The volume is reduced to minimum level with a single press of this button.

⑬ **VOL (VOLUME) +/VOL −**
Turns the sound level up or down.

⑭ **REMOTE CONTROL UNIT — Optional**
NOTE:
The # key is not used to operate this converter.

⑮ **BATTERY ACCESS**
Batteries are located in the bottom compartment of the remote control unit. Press down on the ridged area and push the battery compartment cover away from the unit to remove the cover. Replace the old batteries with new ones (AA size for BR-80, AAA size for BR-81, BR-82 and BR-100). Make sure the positive (+) and negative (−) poles marked on the batteries match the poles marked on the remote control unit.

NOTES:
- *When not using the remote control unit for a long time (one month or more), remove the batteries to prevent any possibility of battery leakage in the compartment.*
- *Never use old and new batteries together. When replacing batteries, always replace all of the batteries at the same time.*
- *Do not lay books or other objects on top of the remote control unit. The operation keys may be depressed, causing a continuous flow of battery power.*

⑯ **OUTPUT CONNECTOR (To TV)**
Connect to the television (VHF Antenna In)

⑰ **INPUT CONNECTOR (CABLE IN)**
Connect to the CATV cable.

⑱ **PARENTAL CONTROL CHANNEL LOCK LEVER**
With the lever lowered to the LOCKED position, channels that have been placed under Parental Control cannot be viewed.

⑲ **CONVERTER AC POWER CORD**
Connect to an AC outlet that is not controlled by a wall switch.

⑳ **AC OUTLET**
Switched AC outlet for TV's AC power (400 W MAX).

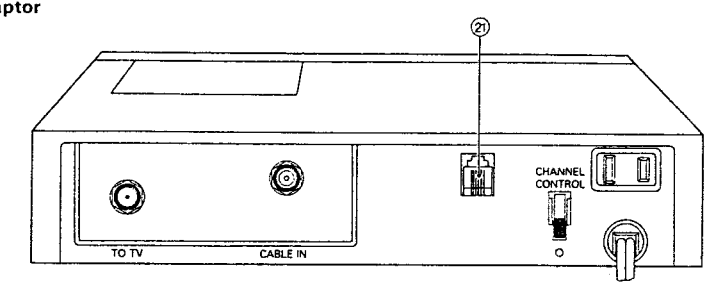
㉑ **TWO-WAY TELEPHONE LINE CONNECTOR — Optional***
Accepts a modular-type telephone cable and connects to an active phone jack.

㉒ **CLOCK ON/OFF**
Turns the display of the time of day on or off.

㉓ **PAY-PER-VIEW CONFIRMATION**
Pressing both keys simultaneously will display the confirmation numbers for pay-per-view event purchases, if any have been made.

* OPTIONAL ACCESSORIES MUST BE INSTALLED BY QUALIFIED SERVICE PERSONNEL ONLY.

BA-6300 series with two-way telephone adaptor



NOTE:
UL caution label is located on the bottom of the converter.